SHORT METHOD
EX-MERIDIAN TABLES,
60° N. TO 60° S.

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SHORT METHOD

EX-MERIDIAN TABLES.

COMPUTED FOR INTERVALS OF ONE MINUTE

Between the Parallels of Latitude 0° and 60° inclusive,

WITH

INSTRUCTIONS FOR USING THE TABLES

IN

FRENCH, GERMAN, SPANISH, PORTUGUESE, ITALIAN, DUTCH, AND SCANDINAVIAN,

BY

JOHN F. R. BATEMAN, LIEUTENANT, R.N.,

AND ASSISTANTS.

DEDICATED TO

VICE-ADMIRAL SIR GEORGE S. NARES, K.C.B., F.R.S., R.N.

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LONDON:

SIMPKIN, MARSHALL, HAMILTON, KENT & CO., LIMITED,

AND

ALL NAUTICAL BOOKSELLERS.

1894.

PRICE SEVEN SHILLINGS AND SIXPENCE NET.

Although these Tables are constructed for the Sun, by subtracting 16′ 1″ from the correction, they can be made available for other heavenly bodies provided their Declination does not exceed 23° N. or S., such as—

Algenib,	**Sirius,**	**Spica,**
Aldebaran,	**Procyon,**	**Arcturus,**
Rigel,	**Regulus,**	**Altair,**
Betelguese,	**β Leonis,**	**Markab.**

PRINTED BY JAMES C. ERSKINE, 140 HOPE STREET, GLASGOW.

ADVERTISEMENT.

THE utility of this work to the Practical Navigator can hardly be exaggerated. The use of Ex-Meridian Altitudes for determining the Latitude is becoming more general, and the compilation of these Tables has reduced the work of the Reduction to the Meridian to a single inspection, thus enabling the Navigator to find his Latitude in a few seconds, from an observation taken within an hour before or an hour after Noon, and without the chances of mistakes occurring, so common to the ordinary methods in use.

The work of computation has extended over a lengthened period, and every care has been taken to keep the Tables free from error.

It should be observed, that owing to the rapid movement of the Sun in low Latitudes, it is necessary that the greatest care should be taken, when the Latitude and Declination are of the same name, to obtain the exact Apparent Time.

To VICE-ADMIRAL SIR GEORGE S. NARES the work is respectfully dedicated, as a small offering in recognition of the valuable interest he has always taken in matters connected with Navigation and Seamanship.

Suggestions tending to the improvement of this work will be received by MESSRS. SIMPKIN, MARSHALL, HAMILTON, KENT & CO., LIMITED, and by them forwarded to the Proprietors.

April, 1894.

Table A.—For Use when Height of the Eye is Greater or Less than 23 Feet.

Height of Eye.	Correction.	Height of Eye.	Correction.
12 feet,	+ 1′ 18″	27 feet,	− 0′ 24″
13 ,,	+ 1 10	28 ,,	− 0 30
14 ,,	+ 1 2	29 ,,	− 0 35
15 ,,	+ 0 54	30 ,,	− 0 41
16 ,,	+ 0 47	31 ,,	− 0 46
17 ,,	+ 0 39	32 ,,	− 0 51
18 ,,	+ 0 32	33 ,,	− 0 56
19 ,,	+ 0 26	34 ,,	− 1 1
20 ,,	+ 0 19	35 ,,	− 1 6
21 ,,	+ 0 12	36 ,,	− 1 11
22 ,,	+ 0 6	37 ,,	− 1 16
23 ,,	+ 0 0	38 ,,	− 1 21
24 ,,	− 0 6	39 ,,	− 1 26
25 ,,	− 0 12	40 ,,	− 1 31
26 ,,	− 0 18		

EXPLANATION OF THE TABLES.

To obtain the Latitude the only data necessary are:—

Latitude by account to nearest Degree.
Declination to nearest Degree.
Apparent Time at Ship to nearest Minute.
Observed Altitude.

If the apparent time is A.M., take it from 12 Hours, the result will be the Hour Angle; if P.M., it is the Hour Angle.

RULE.—In the Tables look out the correction corresponding to Latitude, Declination, and Hour Angle, and add it to the Observed Altitude.

Should the height of observer's eye be more or less than 23 feet look out in Table **A**, the supplementary correction for such height, and apply it as marked in that Table.

These two corrections, applied to the Observed Altitude, will give the Meridian True Altitude, from which the Latitude can be obtained in the ordinary manner.

EXAMPLE:—February 19th, 1891, in Latitude by account 47·15 N., Longitude 7·0 W., at 11 h. 40 m. A.M., the Observed Altitude of the Sun's L. L. was 31° 6′ 50″; Index Error, 1′ 10″ + height of eye, 20 feet. Corrected Declination, 11° 16′ 0″ S.

EXAMPLE WORKED BY SHORT METHOD.

Observed Altitude,		31	6 50
Index Error,	+		1 10
		31	8 0
Correction from Tables,	+		20 15
		31	28 15
Correction from Table **A**,	+		0 19
Meridian True Altitude,		31	28 34
		90	0 0
Meridian Zen. Dist.,		58	31 26 N.
Declination,		11	16 0 S.
Latitude,		47	15 26 N.

SAME EXAMPLE WORKED BY ORDINARY METHOD.

Obsd. Alt.,	31	6 50	
Index Error,	+	1 10	
	31	8 0	
Dip,	−	4 23	
	31	3 7	
Refn.,	−	1 35	
	31	2 2	
Semi-Diam.,	+	16 13	
True Alt.,	31	18 15	
Reduction,	+	10 12	
Mer. T. A.,	31	28 27	
	90	0 0	
Mer. Z. D.,	58	31 33 N.	
Declination,	11	16 0 S.	
Latitude,	47	15 33 N.	

	12 0 0	
	11 40 0	
	0 20 0	Horary Angle Log., 7·27936
Lat. D. R.,	47 15 N.,	Log. Cos., 9·831742
Declination,	11 16 S.,	Log. Cos., 9·991549
Mer. Zen. Dist., by D. R.,	58 31	Log. Cosec., 10·069157
		Log. Sin. ½ Reduction, 7·171808 = 0° 5′ 6″
		2
		Reduction, = 0 10 12

EXPLICATION DES TABLES.

Pour obtenir la latitude on n'a besoin que :—

De la latitude par estime au plus prochain degré.
Du déclin au plus prochain degré.
Du temps apparent au plus prochain minute.
De l'hauteur observée.

Quand le temps apparent est avant midi, il faut le soustraire de 12 heures, le resultat sera l'angle horaire; quand il est après midi, le temps apparent est l'angle horaire.

REGLE.—Prenez des tables la correction correspondante á la latitude, le déclin et l'angle horaire, et l'additionez á l'hauteur observée, si l'élévation de l'œil de l'observateur est plus ou moins de 23 pieds, cherchez dans le table A la correction supplementaire pour telle élévation et l'appliquez comme elle est marquée dans cet table.

Ces deux corrections appliquées á l'hauteur observée donneront l'hauteur vraie meridienne, de laquelle on peut obtenir la latitude selon la manière ordinaire.

EXEMPLE.—Date le 19 Février, 1891, á 11h. 40m. de l'avant midi, dans Latitude par estime 47° 15′ N., Longitude 7° 0′ O. L'hauteur observée du bord inferior du soleil etait 31° 6′ 50″, erreur instrumentale 1′ 10″ +, élévation de l'œil 20 pieds. Déclin corrigé 11° 16′ 0″ S.

	12h.	0m.			
Temps apparent, ...	11	40			
Angle horaire, ...	0	20			
Hauteur observée, ...			31°	6′	50″
Erreur instrumentale, ...			+	1	10
			31	8	0
Correction des tables, ...			+	20	15
			31	28	15
Correction du table A, ...			+	0	19
Vraie hauteur meridienne, ...			31	28	34
			90	0	0
Distance meridienne au zénith, ...			58	31	26 N.
Déclin, ...			11	16	0 S.
Latitude, ...			47	15	26 N.

UITLEGGING VAN DE TAFELEN.

For de bestemming van de breedte der zijn slechts moodzakelijk deeze opgaafen:—

Berekende breedte toe de naaste graad.
Afwijking toe de naaste graad.
Schijnbaare tijd ombord to de naaste minuut.
Beschouwed hoogte.

Indien de schijnbaare tijd is s'voormiddags trek het af van 12, de overblijfsel is de winkel van de stond.

REGEL.—Zoek in de tafelen de correctie na de breedte, afwijking en winkel van de stond en reken het op med de beschouwed hoogte.

Zouden des beschouwers oogen hooger af nederiger dan 23 voet zijn, alsdan zoek in de tafel **A** de hulpcorrectie voor deeze hoogte en wende het aan als het is beschreeven in deze tafel.

Deze twee correctien aangewended med de beschauwende hoogte geven de waare hoogte waaruit de breedte is gevonden in de gewoonlijke wijs.

VORBEELD.—19 Februari, 1891, Breedte als berekend 47·15 N., Long. 7·0 W., ten 40 minuten over 11 s'voormiddags. De beschouwed hoogte van de L. L. der zon was 31° 6′ 50″. Feil in spiegel 1′ 10″ + Hoogte van het oog 20 voet. Verbetered afwijking 11° 16′ 0″.

	uur.	min.	sec.			
	12	0	0			
	11	40	0			
Winkel van de stond, ...	0	20	0			
Beschauwed hoogte, ...				31°	6′	50″
Feil in spiegel, ...				+	1	10
				31	8	0
Verbetering na tafelen voor breedte 47° N., afwkg. 11° S., Winkel van de stond 20 min., ...				+	20	15
				31	28	15
Verbetering na tafel **A** voor hoogte van het oog 20 voet, ...				+	0	19
				31	28	34
				90	0	0
Mer. Zen. Dist., ...				58	31	26 N.
Afwijking, ...				11	16	0 S.
Breedte, ...				47	15	26 N.

ESPLICACION DE LAS TABLAS.

Para obtener la latitud solo necesitan:—

La latitud estimada al mas projimo grado
La declinacion al mas projimo grado.
Hora Verdadera al mas projimo minuto.
La Altura observada.

Si se observa por la mañana (A.M.) ha de sustraer la hora verdadera de 12 horas el resultado será el Angulo Horario, si se observa por la tarde (P.M.) la hora verdera es el Angulo Horario.

REGLA.—En las tablas busque la correccion que corresponde á la latitud, declinacion y Angulo horario y añádela á la altura observada. Quando sea la elevacion del ojo del observador mas ó menos de 23 pies es menester buscar, en la Tabla **A**, la correccion suplementaria aplicandola de la manera marcada en esa tabla.

Estas dos correcciones aplicadas á la altura observada darán la altura verdadera meridiana de la cual se puede obtener la latitud segun la manera ordinaria.

EGEMPLO.—Fecha 19 de Febrero, 1891, en latitud estimada 47° 15′ N., Longitud 7° 0′ O. Hora verdadera 11h. 40m. de la mañana. La altura observada del borde inferior del sol fué 31° 6′ 50″, error del indice 1′ 10″ +, elevacion del ojo 20 pies. Declinacion corregida 11° 16′ 0″ S.

	12h.	0m.	
Hora verdadera, ...	11	40	
Angulo horario, ...	0	20	
Altura observada, ...			31° 6′ 50″
Error del Indice, ...			+ 1 10
			31 8 0
Correccion de las tablas, ...			+ 20 15
			31 28 15
Correccion de la tabla **A**, ...			+ 0 19
Altura verdadera Meridiana, ...			31 28 34
			90 0 0
Distancia meridiana del zenit, ...			58 31 26 N.
Declinacion, ...			11 16 0 S.
			47 15 26 N.

EXPLICAÇÃO DAS TABOAS.

Para obter a latitude só são necessarias:—

A latitude pela estimação ao maís proximo grao.
A declinação ao maís proximo grao.
O Tempo verdadeiro ao maís proximo minuto.
A altura observada.

Se a hora em tempo verdadeiro é A.M. substrahil-o de 12 horas o resultado será o angulo horario, se é P.M. é o angulo horario.

REGRA.—Nas taboas buscáe a correcção correspondente ás latitude, declinação e angulo horario e addil-o á altura observada. Se séja a elevação do olho do observador maís ou menos de 23 pés buscáe na taboa **A**, a correcção correspondente á tal elevação e applical-o á altura observada da maneira que seja marcada n'aquella taboa.

Estas duas correcções applicadas á altura observada darão a altura meridiana verdadeira da qual posse ser obtido a latitude no modo ordinario.

EXEMPLO.—Data 19 de Feverêiro de 1891, na latitude 47° 15′ N., longitude 7° 0′ O. Hora verdadeira 11h. 40m. A.M., a altura observada da borda inferior do sol fôi 31° 6′ 50″, o erro do indice 1′ 10″ + elevação do olho 20 pés. Declinação 11° 16′ 0″ S.

		12h.	0m.
Tempo verdadeiro,	...	11	40
Angulo horario,	...	0	20

Altura observada,	...	31°	6′	50″
Erro do indice,	...	+	1	10
		31	8	0
Correcção das taboas,	...	+	20	15
		31	28	15
Correcção da taboa **A**,	...	+	0	19
Altura meridiana verdadeira,	...	31	28	34
		90	0	0
Distancia meridiana do Zenith,	...	58	31	26 N.
Declinação,	...	11	16	0 S.
Latitude,	...	47	15	26 N.

ESPLICAZIONE DEGLI LISTINI.

Per ottenere la latitudine le sole punte necessario sono :—

La latitudine per calculo al grado prossimo.
Declinazione al grado prossimo.
Tempo apparente a bordo al minuto prossimo.
Altitudine osservata.

Se il tempo apparente è mattutino, sottra il tempo di dodici e la risulta sara il angolo della ora, ma se il tempo è dopo pranzo il è il angolo della ora.

REGOLA.—Negli listini cerca la correzione con proporzione alla latitudine, declinazione e angolo della ora a somma colla altitudine osservata.

Se il occhio d'un osservatore è piu alto o basso dre 23 piedes cerca nel listina **A** la correzione supplementaria per questa altezza e applica como indicado nello listino.

Queste due correzioni applicado alla altitudine osservata darà la vera altitudine del meridiano da quale la latitudine è ottenuto como ordinariamente.

ESEMPIO.—Febbrajo 19, 1891, in latitudine per calculo 47·15 N., long. 7·0 W., tempo 11 oras 40 min. mattutino. La altitudine osservato del L. L. del sole 31° 6′ 50″, errore del specchio 1′ 10″, altitudine dégli occhios 20 piedes. Declinazione correttada 11° 16′ 0″.

	oras.	min.	sec.			
	12	0	0			
	11	40	0			
Angolo della ora ...	0	20	0			

Alt. osserv., ...	31°	6′	50″	
Errore del specchio, ...	+	1	10	
	31	8	0	
Correzione de listini per lat. 47° N. dec. 11° S., angolo della ora 20 min., ...	+	20	15	
	31	28	15	
Correzione de listina **A** per altitudine degli occhios 20 piedes, ...	+	0	19	
	31	28	34	
	90	0	0	
Mer. Zen. Dist., ...	58	31	26	N.
Declinazione, ...	11	16	0	S.
Latitudine, ...	47	15	26	N.

ERKLÄRUNG DER TABELLEN.

Um die Breite zu bestimmen, die einzig notwendigen Daten sind:—

Breite bei Berechnung bis zum nächsten Grade.
Abweichung bis zum nächsten Grade.
Scheinbare Zeit an Bord zur nächsten Minute.
Beobachtete Höhe.

Wenn die scheinbare Zeit am Vormittage ist, nimm sie ab von 12, der Rest giebt den Stundenwinkel; ist sie aber am Nachmittage so ist es der Stundenwinkel.

REGEL.—Suche in den Tabellen die Korrektion nach der Breite, Abweichung, und nach dem Stundenwinkel, und zähle es zu der beobachteten Höhe.

Sollte das Auge des Beobachters mehr oder weniger als 23 Fuss hoch sein, dann suche in Tabelle **A** die Hülfskorrektion für solche Höhe, und wende sie an wie es in dieser Tabelle angegeben ist.

Diese zwei Korrektionen, bei der beobachteten Höhe benutzt geben die wahre Meridianhöhe woraus die Breite in der gewöhnlichen Weise gefunden wird.

BEISPIEL.—Februar 19, 1891, Breite bei Berechnung 47°15 N., Länge 7°0 W., um 11 Uhr 40 Minuten Vormittags. Die beobachtete Höhe der L. L. der Sonne war 31° 6′ 50″ Spiegelfehler 1′ 10″ und die Höhe des Auges 20 Fuss. Verbesserte Abweichung 11° 16′ 0″.

	Stunden.	Min.	Sec.
	12	0	0
	11	40	0
Stundenwinkel ...	0	20	0

Beobachtete Höhe, ...	31°	6′	50″
Spiegelfehler, ...	+	1	10
	31	8	0
Verbesserung nach Tabellen für Breite 47° N., Abro 11° S., Stundenwinkel 20 Min., ...	+	20	15
	31	28	15
Verbesserung nach Tabelle **A** für Angenhöhe 20 Fuss., ...	+	0	19
	31	28	34
	90	0	0
Mer. Zen. Dist., ...	58	31	26 N.
Abweichung, ...	11	16	0 S.
Breite, ...	47	15	26 N.

TABLENE'S FORKLARING.

For finder Breden de alen nodvendige Angivelser ere:

Beregnede Brede til naeste Grad.
Afvigelse til naeste Grad.
Tilsyneladende Tid ombord til naeste Minut.
Iagttagende Hoide.

Hvis tilsyneladende Tid er om Formiddagen, traek Tiden fra 12, Levning er Timevinkelen, men hvis Tiden er om Eftermiddagen det er Timevinkelen.

REGEL.—Sog paa Tabelene Correcturen efter Brede Afvigelse og Timevinkelen og adder det paa iagttagende Hoiden.

Hvis Sagttager's Oine ere mere eller mindre hoi som 25 Fod sog paa Tabelen **A** Hjelpcorrecturene for denne Hoide og brug den som er angiven paa Tabelen.

Denne to Correcturene benytted med den iagttagende Hoide give virkelig Meridians Hoide hvoraf Breden er sogt paa saedvanlig Maade.

EXEMPEL.—Februar 19, 1891, Beregnede Brede 47·15 N., Long. 7·0 W., 40 Minuter over 11 om Formiddagen. Sagttagende Hoiden af Sol's L. L. var 31° 6′ 50″, Speil's feil 1′ 10″ + Oine's Hoide 20 Fod. Forbedret Afvigelse 11° 16′ 0″.

	Kl.	Min.	Sec.
	12	0	0
	11	40	0
Timevinkelen ...	0	20	0

Sagttagende Hoide, ...	31°	6′	50″
Speils feil, ...	+	1	10
	31	8	0
Forbedering med Tabelene for Brede 47° N., Afv. 11 S., Timevinkelen 20 Min., ...	+	20	15
	31	28	15
Forbedring med Tabelen **A** 20 Fod Oine's Hoide, ...	+	0	19
	31	28	34
	90	0	0
Mer. Zen. Dist., ...	58	31	26 N.
Afvigelse, ...	11	16	0 S.
Brede, ...	47	15	26 N.

LATITUDE 0°.

Declination same or contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1	0 12 49	0 18 14	0 26 14	0 35 50	0 47 14	0 59 29	1 11 54	1 25 21	1 38 51	1 52 48	2 6 51	2 20 49	2 35 14	2 49 38	3 4 7
2	0 11 53	0 14 46	0 17 31	0 25 0	0 32 48	0 41 13	0 50 42	1 0 47	1 11 46	1 23 21	1 35 17	1 47 37	2 0 16	2 12 58	2 26 5
3	0 11 43	0 13 37	0 16 37	0 20 42	0 26 19	0 32 26	0 39 34	0 47 25	0 56 19	1 5 33	1 15 18	1 25 38	1 36 35	1 47 43	1 59 15
4	0 11 38	0 12 57	0 15 18	0 18 33	0 22 36	0 27 24	0 33 1	0 39 33	0 46 29	0 54 0	1 2 26	1 11 8	1 20 17	1 29 56	1 39 59
5	0 11 33	0 12 40	0 14 28	0 17 4	0 20 21	0 24 21	0 29 3	0 34 14	0 40 3	0 46 31	0 53 27	1 0 51	1 8 6	1 17 13	1 25 55
6	0 11 28	0 12 24	0 13 51	0 15 59	0 18 37	0 22 12	0 26 1	0 30 33	0 35 39	0 41 3	0 47 2	0 53 31	1 0 27	1 7 43	1 15 27
7	0 11 24	0 12 7	0 13 32	0 15 22	0 17 46	0 20 39	0 23 58	0 27 47	0 32 15	0 36 59	0 42 16	0 47 53	0 54 0	1 0 39	1 7 22
8	0 11 21	0 12 0	0 13 12	0 14 47	0 16 51	0 19 27	0 22 26	0 25 47	0 29 38	0 33 50	0 38 33	0 43 34	0 48 58	0 54 48	1 0 53
9	0 11 20	0 11 59	0 12 59	0 14 26	0 16 14	0 18 47	0 21 7	0 24 14	0 27 38	0 31 26	0 35 35	0 40 8	0 44 59	0 50 14	0 55 44
10	0 11 17	0 11 51	0 12 47	0 14 2	0 15 44	0 17 47	0 20 10	0 22 53	0 25 59	0 29 25	0 33 9	0 37 19	0 41 43	0 46 29	0 51 32
11	0 11 13	0 11 44	0 12 36	0 13 46	0 15 13	0 17 6	0 19 20	0 21 55	0 24 33	0 27 40	0 31 5	0 34 50	0 38 53	0 43 15	0 47 53
12	0 11 10	0 11 40	0 12 26	0 13 30	0 14 51	0 16 34	0 18 34	0 20 51	0 23 24	0 26 17	0 29 26	0 32 54	0 36 36	0 40 38	0 44 53
13	0 11 9	0 11 35	0 12 17	0 13 17	0 14 33	0 16 7	0 17 57	0 20 3	0 22 25	0 25 5	0 27 57	0 31 11	0 34 37	0 38 19	0 42 16
14	0 11 7	0 11 31	0 12 11	0 13 5	0 14 15	0 15 45	0 17 24	0 19 22	0 21 33	0 24 1	0 26 43	0 29 43	0 32 54	0 36 20	0 40 1
15	0 11 6	0 11 29	0 12 4	0 12 55	0 14 0	0 15 21	0 16 57	0 18 46	0 20 48	0 23 7	0 25 37	0 28 25	0 31 23	0 34 36	0 38 2
16	0 11 4	0 11 29	0 11 58	0 12 46	0 13 47	0 15 3	0 16 33	0 18 14	0 20 9	0 22 19	0 24 39	0 27 15	0 30 3	0 33 4	0 36 19
17	0 11 3	0 11 23	0 11 54	0 12 39	0 13 38	0 14 48	0 16 12	0 17 47	0 19 36	0 21 38	0 23 48	0 26 15	0 28 53	0 31 43	0 34 46
18	0 11 2	0 11 20	0 11 50	0 12 33	0 13 27	0 14 33	0 15 59	0 17 22	0 19 4	0 20 59	0 23 3	0 25 22	0 27 50	0 30 30	0 33 22
19	0 11 0	0 11 18	0 11 45	0 12 26	0 13 17	0 14 19	0 15 34	0 16 59	0 18 36	0 20 24	0 22 21	0 24 32	0 26 52	0 29 23	0 32 7
20	0 10 58	0 11 15	0 11 41	0 12 19	0 13 7	0 14 7	0 15 18	0 16 37	0 18 8	0 19 50	0 21 42	0 23 46	0 25 58	0 28 23	0 30 57
21	0 10 57	0 11 13	0 11 37	0 12 14	0 12 59	0 13 55	0 15 3	0 16 18	0 17 48	0 19 25	0 21 11	0 23 8	0 25 15	0 27 31	0 29 57
22	0 10 56	0 11 11	0 11 34	0 12 9	0 12 52	0 13 45	0 14 49	0 16 1	0 17 23	0 18 56	0 20 36	0 22 28	0 24 28	0 26 38	0 28 57
23	0 10 54	0 11 9	0 11 31	0 12 4	0 12 46	0 13 37	0 14 37	0 15 46	0 17 4	0 18 32	0 20 8	0 21 54	0 23 48	0 25 52	0 28 4

Declination same or contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1	3 18 38	3 33 6	3 47 49	4 2 30	4 17 2	4 31 53	4 46 40	5 1 24	5 16 12	5 31 0	5 45 51	6 0 39	6 15 28	6 30 21	6 45 13
2	2 39 30	2 53 4	3 6 44	3 20 25	3 34 13	3 48 19	4 2 22	4 16 27	4 30 28	4 44 57	4 59 15	5 13 31	5 27 51	5 42 27	5 56 52
3	2 11 5	2 23 17	2 35 40	2 48 6	3 0 54	3 13 51	3 26 56	3 40 8	3 53 33	4 7 4	4 20 35	4 34 12	4 47 54	5 1 50	5 15 42
4	1 50 30	2 1 12	2 12 18	2 23 27	2 35 12	2 47 0	2 59 2	3 11 12	3 23 37	3 36 12	3 48 50	4 1 41	4 14 34	4 27 42	4 40 52
5	1 36 6	1 44 42	1 54 34	2 4 41	2 15 1	2 25 49	2 36 48	2 47 58	2 59 26	3 11 3	3 22 45	3 34 43	3 46 51	3 59 8	4 11 29
6	1 23 25	1 31 59	1 40 51	1 49 57	1 59 26	2 9 7	2 18 56	2 29 20	2 39 49	2 50 35	3 1 26	3 12 28	3 23 42	3 34 15	3 46 48
7	1 14 35	1 22 11	1 30 3	1 38 20	1 46 51	1 55 46	2 4 49	2 14 4	2 23 41	2 33 37	2 43 38	2 53 51	3 4 20	3 14 59	3 25 48
8	1 7 27	1 14 20	1 21 25	1 28 51	1 36 39	1 44 40	1 52 59	2 1 36	2 10 26	2 19 28	2 28 46	2 38 19	2 48 1	2 57 56	3 8 16
9	1 1 38	1 7 53	1 14 23	1 21 11	1 28 11	1 35 38	1 43 16	1 51 11	1 59 18	2 7 41	2 16 8	2 25 8	2 34 10	2 43 26	2 52 51
10	0 56 54	1 2 35	1 8 32	1 14 44	1 21 17	1 28 4	1 35 5	1 42 22	1 49 54	1 57 39	2 5 39	2 13 52	2 22 18	2 30 56	2 39 44
11	0 52 48	0 58 5	1 3 30	1 9 8	1 15 17	1 21 31	1 28 1	1 34 48	1 41 46	1 48 58	1 56 26	2 4 5	2 11 56	2 20 1	2 28 15
12	0 49 25	0 54 14	0 59 18	1 4 38	1 10 12	1 16 2	1 22 4	1 28 22	1 34 52	1 41 33	1 48 32	1 55 41	2 3 2	2 10 5	2 18 20
13	0 46 28	0 50 58	0 55 40	1 0 36	1 5 48	1 11 12	1 16 49	1 22 42	1 28 47	1 35 4	1 41 34	1 48 17	1 55 10	2 2 17	2 9 34
14	0 43 57	0 48 7	0 52 30	0 57 7	1 1 58	1 7 1	1 12 17	1 17 47	1 23 30	1 29 22	1 35 30	1 41 47	1 48 15	1 54 57	2 1 48
15	0 41 42	0 45 35	0 49 42	0 54 2	0 58 34	1 3 19	1 8 15	1 13 25	1 18 47	1 24 18	1 30 4	1 36 0	1 42 7	1 48 24	1 54 53
16	0 39 44	0 43 23	0 47 15	0 51 18	0 56 34	1 0 2	1 4 42	1 9 32	1 14 35	1 19 49	1 25 15	1 30 50	1 36 35	1 42 34	1 48 41
17	0 38 0	0 41 27	0 45 4	0 48 54	0 52 55	0 57 7	1 1 30	1 6 6	1 10 52	1 15 47	1 20 56	1 26 13	1 31 40	1 37 18	1 43 7
18	0 36 24	0 39 40	0 43 6	0 46 41	0 50 30	0 54 29	0 58 38	1 2 59	1 7 29	1 12 10	1 17 0	1 22 1	1 27 12	1 32 33	1 38 4
19	0 34 59	0 38 4	0 41 19	0 44 44	0 48 19	0 52 6	0 56 2	1 0 8	1 4 25	1 8 51	1 13 27	1 18 13	1 23 8	1 28 13	1 33 27
20	0 33 41	0 36 36	0 39 40	0 42 54	0 46 19	0 49 54	0 53 38	0 57 33	1 1 37	1 5 49	1 10 12	1 14 44	1 19 24	1 24 15	1 29 14
21	0 32 32	0 35 19	0 38 14	0 41 19	0 44 33	0 47 59	0 51 31	0 55 14	0 59 6	1 3 7	1 7 17	1 11 35	1 16 3	1 20 40	1 25 25
22	0 31 24	0 34 4	0 36 50	0 39 46	0 42 52	0 46 6	0 49 29	0 53 1	0 56 42	1 0 32	1 4 31	1 8 38	1 12 53	1 17 18	1 21 50
23	0 30 25	0 32 57	0 35 35	0 38 23	0 41 20	0 44 25	0 47 40	0 51 2	0 54 33	0 58 13	1 2 1	1 5 56	1 10 0	1 14 12	1 18 33

LATITUDE 0°.

Declination same or contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1	7 0 8	7 14 59	7 29 53	7 44 46	7 59 39	8 14 34	8 29 29	8 44 23	8 59 19	9 14 14	9 29 11	9 44 6	9 59 4	10 13 58	10 28 56
2	6 11 22	6 25 50	6 40 32	6 55 4	7 9 42	7 24 17	7 38 58	7 53 50	8 8 19	8 22 57	8 37 44	8 52 27	9 7 11	9 21 51	9 36 42
3	5 29 40	5 43 38	5 57 44	6 11 46	6 25 55	6 40 8	6 54 28	7 8 44	7 22 59	7 37 21	7 51 46	8 6 9	8 20 32	8 34 58	8 49 30
4	4 54 6	5 7 30	5 20 53	5 34 26	5 48 1	6 1 43	6 15 27	6 29 4	6 43 3	6 56 57	7 10 53	7 24 51	7 38 52	7 52 57	8 7 5
5	4 22 58	4 36 40	4 49 25	5 2 17	5 15 15	5 28 17	5 41 28	5 54 41	6 7 58	6 22 12	6 34 45	6 48 13	7 1 46	7 15 22	7 29 2
6	3 58 35	4 10 30	4 22 31	4 34 40	4 46 56	4 59 19	5 11 48	5 24 26	5 37 6	5 49 54	6 2 50	6 15 54	6 28 46	6 41 53	6 55 4
7	3 36 49	3 47 59	3 59 19	4 10 49	4 22 25	4 34 4	4 46 2	4 58 0	5 10 3	5 22 14	5 34 34	5 46 41	5 59 25	6 11 55	6 24 39
8	3 18 22	3 28 50	3 39 28	3 50 16	4 1 12	4 12 18	4 23 32	4 34 54	4 46 22	4 57 59	5 9 40	5 21 31	5 33 34	5 45 29	5 57 36
9	3 2 29	3 12 18	3 22 19	3 32 27	3 42 45	3 53 15	4 3 49	4 14 36	4 25 29	4 36 31	4 47 40	4 58 55	5 10 18	5 21 45	5 33 23
10	2 48 45	2 57 59	3 7 22	3 16 55	3 26 37	3 36 30	3 46 31	3 56 43	4 7 3	4 17 30	4 28 5	4 38 48	4 49 37	5 0 35	5 11 40
11	2 36 45	2 45 22	2 54 12	3 3 11	3 12 22	3 21 40	3 31 9	3 40 48	3 50 35	4 0 31	4 10 34	4 20 48	4 31 5	4 41 31	4 52 6
12	2 26 17	2 34 24	2 42 44	2 51 13	2 59 49	3 8 39	3 17 37	3 26 44	3 36 2	3 45 27	3 55 0	4 4 42	4 14 32	4 24 28	4 34 33
13	2 17 2	2 24 41	2 32 32	2 40 32	2 48 43	2 57 2	3 5 31	3 14 11	3 22 57	3 31 56	3 41 1	3 50 15	3 59 35	4 9 4	4 18 43
14	2 8 51	2 16 5	2 23 30	2 31 3	2 38 46	2 46 41	2 54 42	3 2 55	3 11 18	3 19 48	3 28 18	3 36 42	3 46 7	3 55 10	4 4 22
15	2 1 32	2 8 22	2 15 23	2 22 32	2 29 51	2 37 51	2 44 59	2 52 47	3 0 43	3 8 49	3 17 2	3 25 25	3 33 53	3 42 32	3 51 19
16	1 54 59	2 1 27	2 8 5	2 14 52	2 21 50	2 28 56	2 36 11	2 43 36	2 51 10	2 58 53	3 6 42	3 14 42	3 22 47	3 31 2	3 39 25
17	1 49 5	1 55 14	2 1 31	2 7 58	2 14 35	2 21 20	2 28 14	2 35 17	2 42 30	2 49 51	2 57 18	3 4 56	3 12 40	3 20 32	3 28 33
18	1 43 45	1 49 34	1 55 34	2 1 42	2 7 58	2 14 24	2 20 58	2 27 41	2 34 35	2 41 35	2 48 42	2 55 58	3 3 22	3 10 54	3 18 34
19	1 38 52	1 44 24	1 50 6	1 55 56	2 1 55	2 8 4	2 14 20	2 20 45	2 27 18	2 34 0	2 40 49	2 47 47	2 54 50	3 2 3	3 9 23
20	1 34 22	1 39 39	1 45 6	1 50 40	1 56 23	2 2 14	2 8 13	2 14 21	2 20 37	2 27 1	2 33 32	2 40 11	2 46 57	2 53 51	3 0 53
21	1 30 19	1 35 23	1 40 34	1 45 52	1 51 20	1 56 56	2 2 38	2 8 31	2 14 31	2 20 38	2 26 52	2 33 15	2 39 44	2 46 21	2 53 5
22	1 26 31	1 31 20	1 36 17	1 41 22	1 46 35	1 51 56	1 57 24	2 3 2	2 8 47	2 14 38	2 20 37	2 26 43	2 32 56	2 39 17	2 45 45
23	1 23 2	1 27 38	1 32 23	1 37 15	1 42 14	1 47 22	1 52 37	1 57 59	2 3 29	2 9 6	2 14 51	2 20 42	2 26 40	2 32 46	2 38 59

Declination same or contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1	10 43 51	10 58 48	11 13 45	11 28 43	11 43 40	11 58 37	12 13 33	12 28 31	12 43 28	12 58 26	13 13 23	13 28 22	13 43 17	13 58 14	14 13 11
2	9 51 28	10 6 13	10 20 58	10 35 49	10 50 37	11 5 25	11 20 13	11 35 4	11 49 54	12 4 45	12 19 34	12 34 27	12 49 17	13 4 9	13 18 57
3	9 4 0	9 18 29	9 32 59	9 47 36	10 2 11	10 16 43	10 31 20	10 45 58	11 0 36	11 15 22	11 29 52	11 44 34	11 59 13	12 13 52	12 28 36
4	8 21 12	8 35 22	8 49 36	9 3 50	9 18 2	9 32 31	9 46 40	10 1 1	10 15 22	10 29 45	10 44 8	10 58 37	11 13 0	11 27 29	11 41 56
5	7 42 44	7 56 30	8 10 19	8 24 8	8 38 1	8 51 56	9 5 55	9 19 54	9 33 56	9 48 0	10 2 7	10 16 14	10 30 23	10 44 33	10 58 46
6	7 8 18	7 21 36	7 34 56	7 48 24	8 1 50	8 15 21	8 28 53	8 42 35	8 56 13	9 9 54	9 23 38	9 37 27	9 51 14	10 5 4	10 17 55
7	6 37 21	6 50 10	7 3 4	7 15 59	7 28 59	7 42 5	7 55 13	8 8 29	8 21 41	8 35 1	8 48 21	9 1 48	9 15 15	9 28 43	9 42 17
8	6 9 50	6 22 4	6 34 31	6 46 57	6 59 31	7 12 8	7 24 48	7 37 34	7 50 24	8 3 15	8 16 12	8 29 11	8 42 15	8 55 22	9 8 34
9	5 45 5	5 56 51	6 8 45	6 20 44	6 32 46	6 44 56	6 57 10	7 9 28	7 21 50	7 34 18	7 46 48	7 59 23	8 12 1	8 24 44	8 37 30
10	5 22 50	5 34 9	5 45 32	5 57 2	6 8 37	6 20 17	6 32 2	6 43 53	6 55 50	7 7 50	7 19 55	7 32 4	7 44 18	7 56 35	8 8 58
11	5 2 46	5 13 35	5 24 31	5 35 30	5 46 35	5 57 48	6 9 7	6 20 31	6 31 58	6 43 34	6 55 13	7 6 57	7 18 45	7 30 39	7 42 36
12	4 44 46	4 55 5	5 5 32	5 16 5	5 26 42	5 37 29	5 48 20	5 59 16	6 0 18	6 21 28	6 32 40	6 44 0	6 55 23	7 6 51	7 18 25
13	4 28 27	4 38 19	4 48 19	4 58 24	5 8 35	5 18 54	5 29 19	5 39 51	5 50 26	6 1 11	6 11 58	6 22 53	6 33 51	6 44 56	6 56 5
14	4 13 40	4 23 6	4 32 38	4 42 18	4 52 4	5 1 58	5 11 57	5 22 4	5 32 6	5 42 34	5 52 58	6 3 27	6 14 2	6 24 43	6 35 28
15	4 0 11	4 9 13	4 18 22	4 27 37	4 36 57	4 46 27	4 56 3	5 5 45	5 15 31	5 25 27	5 35 27	5 45 34	5 55 44	6 6 3	6 16 25
16	3 47 55	3 56 32	4 5 18	4 14 10	4 23 7	4 32 13	4 41 26	4 50 45	5 0 9	5 9 40	5 19 18	5 29 2	5 38 50	5 48 45	5 58 46
17	3 36 41	3 44 56	3 53 20	4 1 49	4 10 24	4 19 8	4 27 58	4 36 55	4 45 58	4 55 8	5 4 23	5 13 45	5 23 11	5 32 45	5 42 23
18	3 26 22	3 34 15	3 42 18	3 50 26	3 58 41	4 7 4	4 15 33	4 24 9	4 32 50	4 41 38	4 50 33	4 59 34	5 8 39	5 17 53	5 27 10
19	3 16 49	3 24 25	3 32 8	3 39 56	3 47 50	3 55 53	4 4 2	4 12 17	4 20 40	4 29 8	4 37 43	4 46 23	4 55 8	5 4 1	5 12 59
20	3 8 2	3 15 17	3 22 42	3 30 11	3 37 47	3 45 31	3 53 20	4 1 17	4 9 20	4 17 29	4 25 44	4 34 6	4 42 32	4 51 5	4 59 43
21	2 59 56	3 6 55	3 14 0	3 21 12	3 28 30	3 35 56	3 43 28	3 51 6	3 58 51	4 6 41	4 14 38	4 22 41	4 30 49	4 39 5	4 47 25
22	2 52 20	2 59 1	3 5 51	3 12 45	3 19 46	3 26 55	3 34 0	3 41 31	3 49 45	3 56 32	4 4 11	4 11 57	4 19 47	4 27 44	4 35 47
23	2 45 18	2 51 44	2 58 16	3 4 56	3 11 40	3 18 34	3 25 32	3 32 36	3 39 47	3 47 3	3 54 27	4 1 55	4 9 28	4 17 9	4 24 55

LATITUDE 1° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 12 49	0 18 14	0 26 14	0 35 50	0 47 14	0 59 29	1 11 54	1 25 21	1 38 51	1 52 48	2 6 51	2 20 49	2 35 14	2 49 38	3 4 7
1	Not	calcula	ble.												
2	0 12 49	0 18 14	0 25 51	0 35 41	0 47 30	0 59 29	1 11 54	1 25 2	1 38 51	1 52 48	2 6 51	2 20 45	2 35 22	2 49 38	3 4 0
3	0 11 53	0 14 46	0 19 13	0 25 0	0 32 48	0 41 13	0 50 42	1 0 47	1 11 52	1 23 18	1 35 3	1 47 24	2 0 12	2 12 53	2 26 0
4	0 11 40	0 13 34	0 16 34	0 20 40	0 26 17	0 32 20	0 39 28	0 47 19	0 56 12	1 5 22	1 15 13	1 25 32	1 36 26	1 47 36	1 59 6
5	0 11 38	0 12 57	0 15 21	0 18 30	0 22 42	0 27 33	0 32 59	0 39 24	0 46 34	0 54 3	1 2 20	1 11 2	1 20 17	1 29 49	1 39 50
6	0 11 32	0 12 40	0 14 28	0 17 4	0 20 23	0 24 21	0 28 57	0 34 9	0 40 8	0 46 29	0 53 24	1 0 47	1 8 47	1 17 7	1 25 53
7	0 11 28	0 12 34	0 13 53	0 15 59	0 18 51	0 22 10	0 25 59	0 30 30	0 35 28	0 40 51	0 46 55	0 53 21	1 0 19	1 7 38	1 15 20
8	0 11 25	0 12 14	0 13 29	0 15 23	0 17 45	0 20 35	0 24 2	0 27 51	0 32 9	0 36 57	0 42 11	0 47 49	0 53 50	1 0 22	1 7 13
9	0 11 21	0 12 1	0 13 13	0 14 47	0 16 56	0 19 26	0 22 23	0 25 47	0 29 35	0 33 49	0 38 26	0 43 29	0 48 50	0 54 42	1 0 48
10	0 11 18	0 11 54	0 12 55	0 14 25	0 16 15	0 18 30	0 21 8	0 24 11	0 27 34	0 31 21	0 35 21	0 39 58	0 44 52	0 50 5	0 55 38
11	0 11 17	0 11 47	0 12 42	0 13 58	0 15 40	0 17 40	0 20 5	0 22 44	0 25 52	0 29 33	0 33 0	0 37 7	0 41 34	0 46 19	0 51 21
12	0 11 16	0 11 43	0 12 34	0 13 42	0 15 16	0 17 6	0 19 15	0 21 40	0 24 31	0 27 38	0 31 4	0 34 44	0 38 51	0 43 10	0 47 45
13	0 11 13	0 11 38	0 12 24	0 13 28	0 14 49	0 16 32	0 18 29	0 20 44	0 23 21	0 26 12	0 29 22	0 32 45	0 36 30	0 40 28	0 44 44
14	0 11 9	0 11 35	0 12 19	0 13 14	0 14 30	0 16 2	0 17 54	0 19 59	0 22 18	0 24 58	0 27 53	0 30 50	0 34 29	0 38 12	0 42 7
15	0 11 7	0 11 32	0 12 10	0 13 4	0 14 14	0 15 40	0 17 19	0 19 15	0 21 25	0 23 52	0 26 34	0 29 32	0 32 40	0 36 6	0 39 45
16	0 11 5	0 11 30	0 12 3	0 12 54	0 14 0	0 15 20	0 16 54	0 18 42	0 20 44	0 23 3	0 25 31	0 28 16	0 31 13	0 34 24	0 37 51
17	0 11 5	0 11 26	0 12 0	0 12 48	0 13 50	0 15 5	0 16 32	0 18 16	0 20 12	0 22 20	0 24 39	0 27 15	0 30 0	0 33 1	0 36 13
18	0 11 4	0 11 23	0 11 55	0 12 40	0 13 38	0 14 45	0 16 13	0 17 44	0 19 32	0 21 35	0 23 46	0 26 18	0 28 49	0 31 37	0 34 35
19	0 11 1	0 11 19	0 11 51	0 12 32	0 13 27	0 14 32	0 15 48	0 17 18	0 19 0	0 20 55	0 23 0	0 25 18	0 27 44	0 30 22	0 33 14
20	0 10 59	0 11 16	0 11 46	0 12 25	0 13 16	0 14 18	0 15 32	0 16 57	0 18 31	0 20 19	0 22 17	0 24 27	0 26 43	0 29 16	0 31 58
21	0 10 58	0 11 14	0 11 43	0 12 21	0 13 9	0 14 8	0 15 15	0 16 36	0 18 7	0 19 50	0 21 41	0 23 44	0 25 56	0 28 20	0 30 53
22	0 10 57	0 11 12	0 11 37	0 12 13	0 12 59	0 13 54	0 15 0	0 16 15	0 17 40	0 19 20	0 21 4	0 23 1	0 25 4	0 27 22	0 29 46
23	0 10 55	0 11 10	0 11 33	0 12 7	0 12 52	0 13 45	0 14 48	0 15 59	0 17 22	0 18 53	0 20 33	0 22 23	0 24 21	0 26 30	0 28 48

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 12 49	0 18 14	0 26 14	0 35 50	0 47 14	0 59 29	1 11 54	1 25 21	1 38 51	1 52 48	2 6 51	2 20 49	2 35 14	2 49 38	3 4 7
1	0 11 53	0 14 26	0 19 26	0 25 21	0 32 43	0 41 13	0 50 42	1 0 54	1 11 46	1 23 21	1 35 16	1 47 34	2 0 12	2 12 58	2 26 13
2	0 11 43	0 13 38	0 16 38	0 20 42	0 26 17	0 32 27	0 39 34	0 47 26	0 56 12	1 5 33	1 15 24	1 25 40	1 36 40	1 47 46	1 59 18
3	0 11 37	0 12 56	0 15 20	0 18 29	0 22 42	0 27 35	0 33 3	0 39 28	0 46 41	0 54 14	1 2 27	1 11 7	1 20 28	1 30 0	1 40 4
4	0 11 32	0 12 39	0 14 30	0 16 57	0 20 30	0 24 23	0 28 56	0 34 11	0 40 14	0 46 35	0 53 33	1 0 56	1 9 5	1 17 19	1 26 1
5	0 11 28	0 12 24	0 13 53	0 15 59	0 18 53	0 22 14	0 26 2	0 30 33	0 35 40	0 41 4	0 47 4	0 53 34	1 0 33	1 7 48	1 15 32
6	0 11 24	0 12 14	0 13 31	0 15 22	0 17 44	0 20 39	0 23 59	0 27 50	0 32 18	0 37 2	0 41 18	0 47 56	0 54 5	1 0 35	1 7 27
7	0 11 21	0 12 0	0 13 14	0 14 47	0 16 56	0 19 29	0 22 26	0 25 46	0 29 40	0 33 53	0 38 35	0 43 37	0 48 58	0 54 51	1 0 58
8	0 11 20	0 11 58	0 12 59	0 14 25	0 16 17	0 18 53	0 21 19	0 24 15	0 27 41	0 31 29	0 35 41	0 40 11	0 45 2	0 50 18	0 55 48
9	0 11 18	0 11 52	0 12 46	0 14 3	0 15 45	0 17 45	0 20 9	0 22 55	0 26 0	0 29 27	0 33 14	0 37 19	0 41 44	0 46 33	0 51 33
10	0 11 15	0 11 45	0 12 36	0 13 46	0 15 19	0 17 5	0 19 26	0 21 48	0 24 37	0 27 46	0 31 12	0 34 57	0 39 3	0 43 25	0 48 3
11	0 11 13	0 11 38	0 12 24	0 13 29	0 14 51	0 16 33	0 18 33	0 20 38	0 23 27	0 26 22	0 29 28	0 32 54	0 36 40	0 40 42	0 44 59
12	0 11 9	0 11 36	0 12 19	0 13 15	0 14 33	0 16 9	0 17 59	0 20 7	0 22 29	0 25 10	0 28 6	0 31 20	0 34 48	0 38 34	0 42 34
13	0 11 7	0 11 32	0 12 11	0 13 8	0 14 20	0 15 46	0 17 30	0 19 25	0 21 38	0 24 6	0 26 47	0 29 48	0 33 1	0 36 28	0 40 11
14	0 11 6	0 11 28	0 12 5	0 12 57	0 14 3	0 15 26	0 16 58	0 18 46	0 20 51	0 23 9	0 25 42	0 28 32	0 31 32	0 34 46	0 38 10
15	0 11 4	0 11 26	0 11 59	0 12 47	0 13 49	0 15 5	0 16 35	0 18 16	0 20 12	0 22 23	0 24 45	0 27 22	0 30 10	0 33 12	0 36 27
16	0 11 2	0 11 25	0 11 53	0 12 39	0 13 37	0 14 49	0 16 12	0 17 47	0 19 37	0 21 33	0 23 53	0 26 19	0 28 59	0 31 50	0 34 54
17	0 11 1	0 11 20	0 11 50	0 12 33	0 13 29	0 14 36	0 15 54	0 17 24	0 19 7	0 21 2	0 23 6	0 25 25	0 27 55	0 30 38	0 33 32
18	0 11 0	0 11 17	0 11 46	0 12 27	0 13 17	0 14 21	0 15 40	0 17 0	0 18 38	0 20 27	0 22 26	0 24 37	0 26 58	0 29 30	0 32 14
19	0 10 58	0 11 15	0 11 41	0 12 21	0 13 10	0 14 8	0 15 20	0 16 40	0 18 14	0 19 57	0 21 48	0 23 51	0 26 5	0 28 29	0 31 6
20	0 10 57	0 11 12	0 11 37	0 12 14	0 13 0	0 13 56	0 15 5	0 16 19	0 17 46	0 19 24	0 21 11	0 23 9	0 25 16	0 27 34	0 30 1
21	0 10 55	0 11 10	0 11 34	0 12 9	0 12 53	0 13 45	0 14 52	0 16 5	0 17 28	0 19 0	0 20 41	0 22 33	0 24 36	0 26 46	0 29 6
22	0 10 54	0 11 9	0 11 31	0 12 4	0 12 46	0 13 37	0 14 39	0 15 48	0 17 7	0 18 35	0 20 10	0 21 58	0 23 54	0 25 58	0 28 12
23	0 10 52	0 11 6	0 11 28	0 11 59	0 12 40	0 13 29	0 14 27	0 15 34	0 16 48	0 18 13	0 19 44	0 21 26	0 23 17	0 25 16	0 27 22

LATITUDE 1° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON. 16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	3 18 38	3 33 6	3 47 49	4 2 30	4 17 2	4 31 53	4 46 40	5 1 24	5 16 12	5 31 0	5 45 51	6 0 39	6 15 28	6 30 21	6 45 13
1	Not	calcula	ble.												
2	3 18 29	3 33 6	3 47 46	4 2 24	4 16 58	4 31 49	4 46 36	5 1 18	5 16 0	5 30 54	5 45 45	6 0 31	6 15 19	6 30 16	6 45 4
3	2 39 25	2 52 57	3 6 38	3 20 16	3 34 3	3 48 5	4 2 11	4 16 16	4 30 27	4 44 45	4 59 1	5 13 21	5 27 42	5 42 15	5 56 42
4	2 10 55	2 23 2	2 35 28	2 47 57	3 0 42	3 13 40	3 26 41	3 39 39	3 53 16	4 6 49	4 20 17	4 33 51	4 47 39	5 1 32	5 15 21
5	1 50 19	2 1 2	2 11 59	2 23 22	2 34 54	2 46 45	2 58 47	3 10 59	3 23 22	3 35 52	3 48 35	4 1 24	4 14 19	4 27 23	4 40 34
6	1 35 2	1 44 33	1 54 23	2 4 33	2 14 59	2 25 41	2 36 39	2 47 47	2 59 9	3 10 50	3 22 35	3 34 30	3 46 34	3 58 54	4 11 12
7	1 23 27	1 31 50	1 40 42	1 49 46	1 59 12	2 8 57	2 18 51	2 29 2	2 39 32	2 50 13	3 1 3	3 12 1	3 23 20	3 34 47	3 46 23
8	1 14 25	1 21 55	1 29 51	1 38 2	1 46 39	1 55 26	2 4 32	2 13 45	2 23 24	2 33 13	2 43 15	2 53 33	3 4 0	3 14 36	3 25 26
9	1 7 17	1 14 6	1 21 15	1 28 42	1 36 27	1 44 28	1 52 44	2 1 19	2 10 8	2 19 9	2 28 27	2 37 57	2 47 39	2 57 33	3 7 39
10	1 1 31	1 7 42	1 14 14	1 20 57	1 28 0	1 35 27	1 42 58	1 50 50	1 58 59	2 7 23	2 15 56	2 24 44	2 33 39	2 43 1	2 52 27
11	0 56 40	1 2 22	1 8 17	1 14 28	1 20 56	1 27 44	1 34 47	1 42 0	1 49 31	1 57 17	2 5 15	2 13 25	2 21 49	2 30 29	2 39 16
12	0 52 40	0 57 52	1 3 23	1 9 8	1 15 1	1 21 18	1 27 45	1 34 31	1 41 28	1 48 42	1 56 5	2 3 43	2 11 32	2 19 36	2 27 51
13	0 49 15	0 54 5	0 59 5	1 4 24	1 9 59	1 15 45	1 21 45	1 27 58	1 34 29	1 41 12	1 48 9	1 55 15	2 2 35	2 10 7	2 17 48
14	0 46 22	0 50 42	0 55 32	1 0 26	1 5 35	1 10 59	1 16 35	1 22 27	1 28 30	1 34 44	1 41 15	1 47 54	1 54 47	2 1 52	2 9 7
15	0 43 38	0 47 45	0 52 7	0 56 42	1 1 31	1 6 32	1 11 45	1 17 17	1 22 52	1 28 43	1 34 47	1 41 3	1 47 28	1 54 5	2 0 55
16	0 41 28	0 45 21	0 49 27	0 53 44	0 59 15	1 2 58	1 7 54	1 13 0	1 18 19	1 23 50	1 29 33	1 35 27	1 41 30	1 47 47	1 54 13
17	0 39 37	0 43 15	0 47 5	0 51 6	0 55 20	0 59 45	1 4 22	1 9 12	1 14 12	1 19 23	1 24 46	1 30 18	1 36 1	1 41 55	1 48 0
18	0 37 47	0 41 15	0 44 53	0 48 39	0 52 40	0 56 53	1 1 16	1 5 49	1 10 33	1 15 30	1 20 34	1 25 51	1 31 19	1 36 37	1 42 45
19	0 36 16	0 39 31	0 42 55	0 46 35	0 50 17	0 54 13	0 58 19	1 2 37	1 7 7	1 11 47	1 16 36	1 21 36	1 26 45	1 32 5	1 37 33
20	0 34 51	0 37 55	0 41 9	0 44 32	0 48 6	0 51 50	0 55 45	0 59 51	1 4 6	1 8 31	1 13 5	1 17 50	1 22 43	1 27 47	1 33 0
21	0 33 36	0 36 31	0 39 34	0 42 43	0 46 6	0 49 41	0 53 23	0 57 16	1 1 18	1 5 31	1 9 49	1 14 19	1 18 59	1 23 48	1 28 45
22	0 32 19	0 35 7	0 38 1	0 41 3	0 44 17	0 47 39	0 51 12	0 54 53	0 58 44	1 2 44	1 6 53	1 11 10	1 15 37	1 20 12	1 24 55
23	0 31 15	0 33 53	0 36 38	0 39 33	0 42 38	0 45 49	0 49 12	0 52 42	0 56 21	1 0 10	1 4 7	1 8 11	1 12 25	1 16 45	1 21 17

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON. 16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	3 18 38	3 33 6	3 47 49	4 2 30	4 17 2	4 31 53	4 46 40	5 1 24	5 16 12	5 31 0	5 45 51	6 0 39	6 15 28	6 30 21	6 45 13
1	2 39 35	2 53 2	3 6 44	3 20 27	3 34 18	3 48 19	4 2 24	4 16 31	4 30 13	4 44 58	4 59 18	5 13 38	5 28 0	5 42 31	5 56 58
2	2 11 8	2 23 22	2 35 42	2 48 14	3 0 59	3 13 56	3 27 1	3 40 18	3 53 40	4 7 11	4 20 42	4 34 20	4 48 2	5 1 59	5 15 48
3	1 50 33	2 1 24	2 12 25	2 23 41	2 35 15	2 47 7	2 59 11	3 11 21	3 23 42	3 36 21	3 48 59	4 1 50	4 14 43	4 27 53	4 41 2
4	1 35 15	1 44 51	1 54 43	2 4 51	2 15 18	2 26 1	2 36 58	2 48 11	2 59 37	3 11 14	3 22 57	3 34 54	3 47 3	3 59 22	4 11 42
5	1 23 39	1 32 4	1 40 56	1 50 1	1 59 33	2 9 16	2 19 16	2 29 29	2 39 58	2 50 42	3 1 36	3 12 39	3 23 55	3 35 24	3 47 2
6	1 14 39	1 22 18	1 30 14	1 38 29	1 47 0	1 55 51	2 4 59	2 14 19	2 23 53	2 33 48	2 43 53	2 54 10	3 4 39	3 15 23	3 26 12
7	1 7 35	1 14 27	1 21 35	1 29 4	1 36 46	1 44 56	1 53 14	2 1 46	2 10 39	2 19 47	2 28 59	2 38 30	2 48 17	2 58 15	3 8 23
8	1 1 46	1 8 2	1 14 30	1 21 17	1 28 26	1 35 49	1 43 23	1 51 24	1 59 32	2 7 5	2 16 32	2 25 26	2 34 29	2 43 38	2 53 12
9	0 57 0	1 2 43	1 8 38	1 14 51	1 21 26	1 28 15	1 35 15	1 42 38	1 50 7	1 57 5	2 5 56	2 14 12	2 22 36	2 31 9	2 40 6
10	0 52 59	0 58 15	1 3 46	1 9 28	1 15 29	1 21 44	1 28 18	1 35 2	1 42 4	1 49 18	1 56 49	2 4 24	2 12 15	2 20 20	2 28 44
11	0 49 32	0 54 24	0 59 27	1 4 47	1 10 23	1 16 12	1 22 17	1 28 34	1 35 5	1 41 50	1 48 48	1 55 58	2 3 23	2 11 0	2 18 43
12	0 46 47	0 51 15	0 55 58	1 0 51	1 6 4	1 11 31	1 17 10	1 23 3	1 29 8	1 35 25	1 41 54	1 48 37	1 55 34	2 2 42	2 10 1
13	0 44 8	0 48 23	0 52 47	0 57 25	1 2 20	1 7 17	1 12 34	1 18 5	1 23 50	1 29 42	1 35 48	1 42 7	1 48 35	1 55 17	2 2 8
14	0 41 50	0 45 45	0 49 55	0 54 14	0 58 47	1 3 33	1 8 32	1 13 42	1 19 5	1 24 39	1 30 25	1 36 23	1 42 31	1 48 51	1 55 22
15	0 39 56	0 43 37	0 47 31	0 51 36	0 55 53	1 0 22	1 5 1	1 9 54	1 14 58	1 20 7	1 25 36	1 31 14	1 37 3	1 43 2	1 49 11
16	0 38 8	0 41 36	0 45 16	0 49 6	0 53 7	0 57 20	1 1 46	1 6 22	1 11 9	1 16 8	1 21 17	1 26 36	1 32 4	1 37 46	1 43 37
17	0 36 36	0 39 54	0 43 18	0 46 58	0 50 46	0 54 46	0 58 56	1 3 18	1 7 50	1 12 32	1 17 25	1 22 27	1 27 36	1 32 59	1 38 31
18	0 35 8	0 38 15	0 41 28	0 44 55	0 48 31	0 52 20	0 56 19	1 0 26	1 4 44	1 9 12	1 13 49	1 18 36	1 23 33	1 28 40	1 33 59
19	0 33 52	0 36 49	0 39 53	0 43 8	0 46 34	0 50 11	0 53 56	0 57 52	1 1 57	1 6 13	1 10 37	1 15 11	1 19 54	1 24 46	1 29 47
20	0 32 38	0 35 26	0 38 23	0 41 30	0 44 47	0 48 13	0 51 47	0 55 32	0 59 26	1 3 28	1 7 39	1 12 0	1 16 28	1 21 7	1 25 54
21	0 31 36	0 34 16	0 37 3	0 40 1	0 43 7	0 46 25	0 49 49	0 53 23	0 57 6	1 0 58	1 4 58	1 9 5	1 13 22	1 17 49	1 22 21
22	0 30 34	0 33 6	0 35 46	0 38 34	0 41 34	0 44 41	0 47 57	0 51 17	0 54 50	0 58 31	1 2 22	1 6 20	1 10 26	1 14 36	1 19 2
23	0 29 39	0 32 6	0 34 38	0 37 19	0 40 10	0 43 9	0 46 15	0 49 29	0 52 51	0 56 23	1 0 3	1 3 50	1 7 47	1 11 49	1 16 1

LATITUDE 1° NORTH OR SOUTH.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	7 0 8	7 14 59	7 29 53	7 44 46	7 59 39	8 14 34	8 29 29	8 44 23	8 59 19	9 14 14	9 29 11	9 44 6	9 59 4	10 13 58	10 28 56
1	6 11 29	6 25 59	6 40 37	6 55 11	7 9 49	7 24 26	7 39 3	7 53 46	8 8 27	8 23 6	8 37 51	8 52 37	9 7 22	9 22 4	9 36 52
2	5 29 45	5 43 45	5 57 53	6 11 55	6 26 4	6 40 18	6 54 39	7 8 54	7 23 12	7 37 32	7 51 47	8 6 20	8 20 43	8 35 12	8 49 43
3	4 54 21	5 7 43	5 21 11	5 34 41	5 48 17	6 1 56	6 15 42	6 29 30	6 43 20	6 57 12	7 11 10	7 25 6	7 39 6	7 53 13	8 7 23
4	4 24 17	4 36 53	4 49 43	5 2 35	5 15 32	5 28 34	5 41 45	5 54 59	6 8 17	6 21 39	6 35 5	6 48 35	7 2 8	7 15 44	7 29 29
5	3 58 48	4 10 44	4 22 46	4 34 58	4 47 15	4 59 41	5 12 12	5 24 47	5 37 30	5 49 16	6 3 13	6 16 9	6 29 11	6 42 18	6 55 31
6	3 37 14	3 48 24	3 59 46	4 11 13	4 22 49	4 34 34	4 46 29	4 58 28	5 10 35	5 22 44	5 35 5	5 47 30	5 59 59	6 12 35	6 25 15
7	3 18 46	3 29 17	3 39 53	3 50 39	4 1 39	4 12 41	4 24 2	4 35 22	4 46 51	4 58 28	5 10 20	5 21 59	5 34 6	5 45 59	5 58 12
8	3 2 45	3 12 40	3 22 40	3 32 50	3 43 11	3 53 41	4 4 17	4 15 1	4 25 56	4 37 0	4 48 10	4 59 29	5 11 6	5 22 22	5 33 59
9	2 49 6	2 58 28	3 7 50	3 17 21	3 27 5	3 36 57	3 47 2	3 57 14	4 7 34	4 18 3	4 28 44	4 29 33	4 50 38	5 1 22	5 12 26
10	2 37 11	2 45 51	2 54 42	3 3 44	3 12 56	3 22 16	3 31 47	3 41 27	3 51 14	4 1 10	4 11 15	4 21 29	4 31 49	4 42 18	4 52 54
11	2 26 40	2 34 49	2 43 10	2 51 40	3 2 50	3 9 11	3 18 13	3 27 21	3 36 37	3 46 5	3 55 39	4 5 22	4 15 13	4 25 2	4 35 20
12	2 17 31	2 25 10	2 33 4	2 41 6	2 49 17	2 57 40	3 6 9	3 14 49	3 23 39	3 32 39	3 41 46	3 51 1	4 0 25	4 9 53	4 19 34
13	2 9 11	2 16 24	2 23 50	2 31 32	2 39 18	2 47 14	2 55 20	3 3 34	3 11 58	3 20 31	3 29 12	3 38 1	3 46 58	3 56 2	4 5 12
14	2 2 1	2 8 53	2 15 55	2 23 6	2 30 27	2 37 58	2 45 37	2 53 27	3 1 26	3 9 33	3 17 44	3 26 5	3 34 51	3 43 25	3 52 15
15	1 54 25	2 0 55	2 7 34	2 14 23	2 21 20	2 28 28	2 35 44	2 43 10	2 50 43	2 58 26	3 6 16	3 14 16	3 22 17	3 30 40	3 39 3
16	1 49 37	1 55 47	2 2 7	2 8 42	2 15 20	2 22 10	2 29 6	2 36 12	2 43 26	2 50 50	2 58 19	3 5 58	3 13 44	3 21 39	3 29 40
17	1 44 14	1 50 5	1 56 6	2 2 17	2 8 36	2 15 4	2 21 41	2 28 26	2 35 20	2 42 21	2 49 30	2 56 50	3 4 16	3 11 52	3 19 33
18	1 39 19	1 44 51	1 50 35	1 56 27	2 2 28	2 8 38	2 14 54	2 21 21	2 27 56	2 34 39	2 41 30	2 48 30	2 55 57	3 2 53	3 10 8
19	1 34 56	1 40 11	1 45 40	1 51 16	1 57 0	2 2 53	2 8 55	2 15 5	2 21 22	2 27 48	2 34 22	2 41 4	2 47 52	2 54 50	3 1 55
20	1 30 48	1 35 52	1 41 9	1 46 28	1 51 56	1 57 34	2 3 19	2 9 14	2 15 15	2 21 25	2 27 41	2 34 4	2 40 37	2 47 16	2 54 3
21	1 27 3	1 31 47	1 36 46	1 41 52	1 47 8	1 52 37	1 58 7	2 3 48	2 9 36	2 15 29	2 21 30	2 27 39	2 33 55	2 40 18	2 46 49
22	1 23 32	1 28 11	1 32 57	1 37 51	1 42 53	1 48 3	1 53 20	1 58 47	2 4 21	2 10 1	2 15 46	2 21 39	2 27 38	2 33 44	2 39 59
23	1 20 20	1 24 42	1 29 16	1 33 57	1 38 45	1 43 43	1 48 49	1 54 0	1 59 18	2 4 42	2 10 21	2 16 0	2 21 45	2 27 39	2 33 40

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	10 43 51	10 58 48	11 13 45	11 28 43	11 43 40	11 58 37	12 13 33	12 28 31	12 43 28	12 58 26	13 13 23	13 28 22	13 43 17	13 58 14	14 13 11
1	9 51 39	10 6 26	10 21 13	10 36 0	10 50 50	11 5 40	11 20 19	11 35 19	11 50 7	12 4 57	12 19 44	12 34 38	12 49 38	13 4 17	13 19 6
2	9 4 12	9 18 42	9 33 20	9 47 50	10 2 25	10 16 56	10 31 33	10 46 13	11 0 50	11 15 29	11 29 58	11 44 49	11 59 31	12 14 11	12 28 51
3	8 21 30	8 35 40	8 49 53	9 4 9	9 18 23	9 32 41	9 46 58	10 1 21	10 15 43	10 30 5	10 44 31	10 58 57	11 13 23	11 27 50	11 42 19
4	7 43 10	7 56 56	8 10 46	8 24 35	8 38 30	8 52 26	9 6 25	9 20 28	9 34 29	9 48 32	10 2 38	10 16 46	10 30 55	10 45 6	10 59 18
5	7 8 45	7 22 1	7 35 25	7 48 52	8 2 20	8 15 49	8 29 25	8 43 2	8 56 45	9 10 27	9 24 12	9 37 59	9 51 50	10 5 42	10 19 36
6	6 37 59	6 50 50	7 3 44	7 16 35	7 29 43	7 42 49	7 55 58	8 9 13	8 22 28	8 35 46	8 49 7	9 2 35	9 15 58	9 29 29	9 43 1
7	6 10 23	6 22 41	6 35 4	6 47 34	7 0 8	7 12 47	7 25 28	7 38 19	7 51 6	8 4 10	8 16 54	8 29 58	8 43 2	8 58 8	9 9 19
8	5 45 40	5 57 28	6 9 26	6 21 21	6 33 24	6 45 38	6 57 55	7 10 15	7 22 38	7 35 5	7 47 37	8 0 13	8 12 53	8 25 38	8 38 28
9	5 23 33	5 34 50	5 46 17	5 57 46	6 9 23	6 21 6	6 32 52	6 44 45	6 56 41	7 8 44	7 20 52	7 33 2	7 45 16	7 57 36	8 10 1
10	5 3 37	5 14 24	5 25 20	5 36 23	5 47 32	5 58 46	6 10 5	6 21 29	6 33 0	6 44 36	6 56 17	7 8 2	7 19 51	7 31 43	7 43 46
11	4 45 34	4 55 5	5 6 22	5 16 54	5 27 36	5 38 23	5 49 15	6 0 14	6 11 18	6 22 28	6 33 44	6 45 7	6 56 32	7 8 1	7 19 33
12	4 29 21	4 39 14	4 49 15	4 59 24	5 9 36	5 19 57	5 30 22	5 40 57	5 51 35	6 2 19	6 13 8	6 24 5	6 35 5	6 46 11	6 57 22
13	4 14 33	4 24 0	4 33 35	4 43 16	4 53 3	5 2 59	5 13 1	5 23 10	5 33 22	5 43 43	5 54 9	6 4 42	6 15 18	6 26 1	6 36 49
14	4 1 9	4 10 12	4 19 2	4 28 42	4 38 3	4 47 33	4 57 11	5 6 56	5 16 35	5 26 37	5 36 39	5 46 46	5 56 59	6 7 18	6 17 42
15	3 47 33	3 56 12	4 4 58	4 13 50	4 22 48	4 31 54	4 41 6	4 50 26	4 59 49	5 9 20	5 18 58	5 28 42	5 38 30	5 48 26	5 58 25
16	3 37 49	3 46 4	3 54 26	4 2 57	4 11 34	4 20 19	4 29 12	4 38 10	4 47 13	4 56 23	5 5 39	5 15 3	5 24 33	5 34 7	5 43 46
17	3 27 22	3 35 18	3 43 23	3 51 33	3 59 50	4 8 15	4 16 46	4 25 23	4 34 6	4 42 58	4 51 56	5 0 58	5 10 5	5 19 18	5 28 36
18	3 17 38	3 25 14	3 32 58	3 40 48	3 48 46	3 56 51	4 5 4	4 13 22	4 21 44	4 30 13	4 38 49	4 47 32	4 56 18	5 5 12	5 14 11
19	3 9 6	3 16 23	3 23 46	3 31 18	3 38 56	3 46 43	3 54 36	4 2 35	4 10 41	4 18 52	4 27 9	4 35 28	4 43 51	4 52 27	5 1 8
20	3 0 57	3 7 57	3 15 5	3 22 18	3 29 39	3 37 6	3 44 39	3 52 20	4 0 7	4 8 2	4 16 1	4 24 6	4 32 17	4 40 34	4 48 57
21	2 53 29	3 0 12	3 7 2	3 13 59	3 21 2	3 28 12	3 35 28	3 42 50	3 50 20	3 57 55	4 5 35	4 13 22	4 21 16	4 29 16	4 37 21
22	2 46 22	2 52 51	2 59 27	3 6 8	3 12 55	3 19 51	3 26 47	3 34 0	3 41 5	3 48 33	3 55 57	4 3 27	4 11 6	4 18 47	4 26 38
23	2 39 47	2 46 0	2 52 20	2 58 48	3 5 21	3 12 1	3 18 47	3 25 37	3 32 35	3 39 19	3 46 28	3 53 41	4 1 9	4 8 37	4 16 11

LATITUDE 2° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 11 53	0 14 46	0 17 31	0 25 0	0 32 48	0 41 13	0 50 42	1 0 47	1 11 46	1 23 21	1 35 17	1 47 32	2 0 16	2 12 58	2 26 5
1	0 12 49	0 18 14	0 25 51	0 35 41	0 47 30	0 59 29	1 11 54	1 25 2	1 38 51	1 52 48	2 6 51	2 20 45	2 35 22	2 49 38	3 4 0
2	Not calculable.														
3	0 12 49	0 18 14	0 25 53	0 35 44	0 47 35	0 59 29	1 11 50	1 24 58	1 38 56	1 52 45	2 6 45	2 20 40	2 35 5	2 49 27	3 3 54
4	0 11 53	0 14 46	0 19 20	0 25 0	0 32 45	0 41 4	0 50 18	1 0 45	1 11 46	1 23 13	1 34 57	1 47 16	2 0 3	2 12 46	2 25 50
5	0 11 44	0 13 39	0 16 37	0 20 43	0 26 17	0 32 24	0 39 31	0 47 21	0 56 10	1 5 19	1 15 3	1 25 27	1 36 21	1 47 30	1 58 58
6	0 11 40	0 13 6	0 15 18	0 18 31	0 22 42	0 27 30	0 33 3	0 39 21	0 46 29	0 54 2	1 2 10	1 10 51	1 20 6	1 29 43	1 39 43
7	0 11 36	0 12 39	0 14 30	0 16 57	0 20 25	0 24 19	0 28 50	0 34 0	0 39 57	0 46 10	0 53 18	1 0 41	1 8 40	1 16 52	1 25 41
8	0 11 32	0 12 26	0 13 53	0 15 57	0 18 49	0 22 5	0 25 57	0 30 28	0 35 30	0 40 54	0 46 52	0 53 20	1 0 12	1 7 34	1 15 12
9	0 11 28	0 12 14	0 13 31	0 15 12	0 17 43	0 20 36	0 23 59	0 27 48	0 32 14	0 36 51	0 42 6	0 47 44	0 53 46	1 0 10	1 7 1
10	0 11 24	0 12 1	0 13 13	0 14 45	0 16 51	0 19 24	0 22 21	0 25 41	0 29 35	0 33 42	0 38 24	0 43 22	0 48 46	0 54 32	1 0 40
11	0 11 20	0 11 55	0 12 56	0 14 22	0 16 13	0 18 27	0 21 3	0 24 5	0 27 28	0 31 14	0 35 35	0 39 53	0 44 44	0 49 56	0 55 26
12	0 11 18	0 11 47	0 12 42	0 13 58	0 15 39	0 17 40	0 19 59	0 22 42	0 25 47	0 29 13	0 32 56	0 37 0	0 41 29	0 46 11	0 51 11
13	0 11 15	0 11 42	0 12 33	0 13 41	0 15 14	0 17 4	0 19 12	0 21 37	0 24 26	0 27 33	0 30 56	0 34 39	0 38 41	0 42 58	0 47 36
14	0 11 14	0 11 39	0 12 24	0 13 28	0 14 51	0 16 31	0 18 27	0 20 43	0 23 21	0 26 10	0 29 16	0 32 40	0 36 23	0 40 23	0 44 36
15	0 11 12	0 11 35	0 12 17	0 13 14	0 14 31	0 16 2	0 17 49	0 19 53	0 22 13	0 24 50	0 27 42	0 30 51	0 34 12	0 37 52	0 41 46
16	0 11 9	0 11 32	0 12 8	0 13 2	0 14 13	0 15 38	0 17 18	0 19 13	0 21 24	0 23 53	0 26 31	0 29 27	0 32 35	0 35 59	0 39 40
17	0 11 7	0 11 30	0 12 3	0 12 57	0 14 2	0 15 22	0 16 53	0 18 45	0 20 48	0 23 4	0 25 33	0 28 19	0 31 12	0 34 26	0 37 49
18	0 11 6	0 11 26	0 12 0	0 12 48	0 13 49	0 14 59	0 16 29	0 18 8	0 20 3	0 22 14	0 24 33	0 27 18	0 29 53	0 32 50	0 36 0
19	0 11 3	0 11 20	0 11 57	0 12 39	0 13 38	0 14 45	0 16 5	0 17 40	0 19 27	0 21 29	0 23 42	0 26 7	0 28 40	0 31 28	0 34 29
20	0 11 1	0 11 18	0 11 51	0 12 31	0 13 25	0 14 29	0 15 47	0 17 18	0 18 56	0 20 50	0 22 54	0 25 11	0 27 33	0 30 14	0 33 4
21	0 11 0	0 11 16	0 11 47	0 12 26	0 13 17	0 14 18	0 15 27	0 16 53	0 18 29	0 20 17	0 22 13	0 24 23	0 26 40	0 29 12	0 31 52
22	0 10 58	0 11 14	0 11 41	0 12 17	0 13 7	0 14 3	0 15 13	0 16 31	0 18 0	0 19 45	0 21 34	0 23 37	0 25 45	0 28 10	0 30 40
23	0 10 57	0 11 12	0 11 36	0 12 11	0 12 59	0 13 53	0 14 59	0 16 13	0 17 40	0 19 15	0 20 59	0 22 54	0 24 58	0 27 12	0 29 36

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 11 53	0 14 46	0 17 31	0 25 0	0 32 48	0 41 13	0 50 42	1 0 47	1 11 46	1 23 21	1 35 17	1 47 32	2 0 16	2 12 58	2 26 5
1	0 11 43	0 13 38	0 16 38	0 20 42	0 26 17	0 32 27	0 39 34	0 47 26	0 56 12	1 5 33	1 15 24	1 25 40	1 36 40	1 47 46	1 59 18
2	0 11 37	0 12 56	0 15 20	0 18 29	0 22 42	0 27 34	0 33 9	0 39 28	0 46 36	0 54 13	1 2 27	1 11 7	1 20 28	1 30 0	1 40 3
3	0 11 31	0 12 38	0 14 29	0 16 56	0 20 29	0 24 23	0 28 56	0 34 10	0 40 13	0 46 37	0 53 34	1 0 55	1 9 0	1 17 20	1 26 3
4	0 11 28	0 12 24	0 13 53	0 15 59	0 18 53	0 22 14	0 26 5	0 30 24	0 35 41	0 41 10	0 47 6	0 53 36	1 0 36	1 7 54	1 15 36
5	0 11 24	0 12 7	0 13 32	0 15 22	0 17 47	0 20 40	0 23 59	0 27 50	0 32 20	0 37 3	0 42 22	0 47 59	0 54 10	1 0 39	1 7 32
6	0 11 21	0 12 0	0 13 13	0 14 47	0 16 55	0 19 30	0 22 27	0 25 48	0 29 44	0 33 56	0 38 37	0 43 39	0 49 6	0 54 54	1 1 5
7	0 11 19	0 11 54	0 12 56	0 14 25	0 16 20	0 18 34	0 21 12	0 24 13	0 27 41	0 31 30	0 35 42	0 40 13	0 45 8	0 50 35	0 55 59
8	0 11 17	0 11 50	0 12 45	0 14 0	0 15 45	0 17 45	0 20 10	0 22 52	0 26 0	0 29 29	0 33 17	0 37 23	0 41 49	0 46 40	0 51 39
9	0 11 16	0 11 46	0 12 37	0 13 46	0 15 19	0 17 10	0 19 21	0 21 51	0 24 42	0 27 50	0 31 17	0 35 2	0 39 3	0 43 28	0 48 4
10	0 11 15	0 11 44	0 12 21	0 13 33	0 14 56	0 16 37	0 18 39	0 20 56	0 23 32	0 26 26	0 29 36	0 33 3	0 36 49	0 40 51	0 45 9
11	0 11 12	0 11 43	0 12 16	0 13 17	0 14 34	0 16 8	0 17 58	0 20 6	0 22 28	0 25 10	0 28 6	0 31 18	0 34 45	0 38 29	0 42 28
12	0 11 8	0 11 32	0 12 12	0 13 3	0 14 17	0 15 46	0 17 28	0 19 27	0 21 40	0 24 10	0 26 54	0 29 55	0 33 10	0 36 41	0 40 26
13	0 11 6	0 11 29	0 12 5	0 12 59	0 14 7	0 15 26	0 17 4	0 18 51	0 20 56	0 23 14	0 25 45	0 28 34	0 31 35	0 34 19	0 38 19
14	0 11 5	0 11 25	0 12 0	0 12 49	0 13 51	0 15 8	0 16 35	0 18 15	0 20 13	0 22 22	0 24 47	0 27 27	0 30 18	0 33 20	0 36 32
15	0 11 2	0 11 23	0 11 54	0 12 40	0 13 39	0 14 50	0 16 14	0 17 48	0 19 39	0 21 42	0 23 57	0 26 25	0 29 4	0 31 56	0 35 1
16	0 11 0	0 11 22	0 11 49	0 12 33	0 13 27	0 14 36	0 15 53	0 17 23	0 19 8	0 20 59	0 23 11	0 25 29	0 28 1	0 30 42	0 33 36
17	0 10 59	0 11 17	0 11 46	0 12 27	0 13 20	0 14 24	0 15 37	0 17 3	0 18 40	0 20 28	0 22 28	0 24 39	0 27 2	0 29 38	0 32 23
18	0 10 58	0 11 15	0 11 42	0 12 21	0 13 8	0 14 9	0 15 23	0 16 41	0 18 15	0 19 58	0 21 51	0 23 56	0 26 11	0 28 36	0 31 12
19	0 10 57	0 11 13	0 11 38	0 12 16	0 13 3	0 13 58	0 15 7	0 16 23	0 17 53	0 19 31	0 21 18	0 23 14	0 25 22	0 27 40	0 30 10
20	0 10 56	0 11 10	0 11 34	0 12 9	0 12 53	0 13 46	0 14 52	0 16 3	0 17 26	0 19 0	0 20 43	0 22 35	0 24 37	0 26 48	0 29 10
21	0 10 56	0 11 10	0 11 32	0 12 6	0 12 48	0 13 41	0 14 40	0 15 50	0 17 10	0 18 38	0 20 14	0 22 1	0 24 0	0 26 5	0 28 19
22	0 10 53	0 11 7	0 11 28	0 12 0	0 12 40	0 13 29	0 14 29	0 15 36	0 16 51	0 18 15	0 19 47	0 21 30	0 23 22	0 25 21	0 27 29
23	0 10 50	0 11 4	0 11 25	0 11 55	0 12 34	0 13 21	0 14 17	0 15 22	0 16 33	0 17 55	0 19 22	0 21 0	0 22 47	0 24 42	0 26 44

LATITUDE 2° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	2 39 30	2 53 4	3 6 44	3 20 25	3 34 13	3 48 19	4 2 22	4 16 27	4 30 28	4 44 57	4 59 15	5 13 31	5 27 51	5 42 27	5 56 52
1	3 18 29	3 33 6	3 47 46	4 2 24	4 16 58	4 31 49	4 46 36	5 1 18	5 16 0	5 30 54	5 45 45	6 0 31	6 15 19	6 30 16	6 45 4
2	Not calculable.														
3	3 18 20	3 32 56	3 47 37	4 2 10	4 16 48	4 31 39	4 46 24	5 1 3	5 15 37	5 30 40	5 45 29	6 0 14	6 14 57	6 29 53	6 44 47
4	2 39 13	2 52 46	3 6 20	3 19 58	3 33 51	3 47 52	4 1 53	4 15 54	4 30 3	4 44 26	4 58 43	5 12 56	5 27 23	5 41 50	5 56 18
5	2 10 48	2 22 50	2 35 13	2 47 44	3 0 31	3 13 27	3 26 31	3 39 43	3 53 2	4 6 31	4 19 57	4 33 39	4 47 22	5 1 9	5 14 58
6	1 50 10	2 0 52	2 11 54	2 23 11	2 34 44	2 46 31	2 58 35	3 10 43	3 23 3	3 35 40	3 48 16	4 1 1	4 13 57	4 27 4	4 40 9
7	1 34 47	1 44 24	1 54 12	2 4 14	2 14 10	2 25 24	2 36 20	2 47 25	2 58 48	3 10 20	3 22 4	3 33 56	3 46 5	3 58 17	4 10 44
8	1 23 15	1 31 43	1 40 33	1 49 33	1 58 56	2 8 39	2 18 35	2 28 50	2 39 11	2 49 49	3 0 43	3 11 40	3 22 56	3 34 22	3 45 58
9	1 14 14	1 21 47	1 29 41	1 37 51	1 46 23	1 55 9	2 4 12	2 13 29	2 23 6	2 32 50	2 42 55	2 53 5	3 3 33	3 14 9	3 24 59
10	1 7 7	1 13 54	1 21 0	1 28 29	1 36 11	1 44 12	1 52 26	2 0 57	2 9 45	2 18 46	2 28 2	2 37 31	2 47 11	2 57 8	3 7 8
11	1 1 18	1 7 26	1 13 57	1 20 43	1 27 46	1 35 3	1 42 41	1 50 30	1 58 38	2 6 58	2 15 31	2 24 17	2 33 16	2 42 2	2 51 54
12	0 56 29	1 2 9	1 8 5	1 14 15	1 20 42	1 27 27	1 34 27	1 41 42	1 49 10	1 56 56	2 4 51	2 11 56	2 21 22	2 29 56	2 38 45
13	0 52 30	0 57 42	1 3 6	1 8 50	1 14 45	1 21 0	1 27 27	1 34 9	1 41 5	1 48 17	1 55 41	2 3 16	2 11 3	2 19 4	2 27 17
14	0 49 5	0 53 53	0 58 57	1 4 12	1 9 43	1 15 28	1 21 30	1 27 41	1 34 8	1 40 49	1 47 43	1 54 51	2 2 8	2 9 39	2 17 20
15	0 45 53	0 50 15	0 54 53	0 59 45	1 4 52	1 10 10	1 15 41	1 21 36	1 27 26	1 33 39	1 40 1	1 46 39	1 53 24	2 0 23	2 7 35
16	0 43 30	0 47 37	0 51 59	0 56 32	1 2 21	1 6 21	1 11 35	1 17 0	1 22 38	1 28 29	1 34 31	1 40 46	1 47 9	1 53 47	2 0 34
17	0 41 25	0 45 17	0 49 22	0 53 36	0 58 5	1 2 45	1 7 38	1 12 45	1 18 0	1 23 29	1 29 9	1 34 59	1 41 1	1 47 14	1 53 38
18	0 39 22	0 43 2	0 46 49	0 50 51	0 55 5	0 59 33	1 4 10	1 8 57	1 13 55	1 19 9	1 24 29	1 30 3	1 35 48	1 41 43	1 47 48
19	0 37 41	0 41 6	0 44 41	0 48 37	0 52 27	0 56 34	1 0 53	1 5 24	1 10 8	1 15 3	1 20 5	1 25 20	1 30 46	1 36 22	1 42 4
20	0 36 7	0 39 20	0 42 45	0 46 17	0 50 1	0 53 57	0 58 3	1 2 21	1 6 48	1 11 26	1 16 12	1 21 12	1 26 19	1 31 37	1 37 4
21	0 34 43	0 37 46	0 40 58	0 44 16	0 47 48	0 51 33	0 55 26	0 59 30	1 3 43	1 8 8	1 12 37	1 17 20	1 22 13	1 27 15	1 32 25
22	0 33 20	0 36 16	0 39 18	0 42 28	0 45 50	0 49 21	0 53 4	0 56 55	1 0 56	1 5 7	1 9 25	1 13 53	1 18 32	1 23 19	1 28 13
23	0 32 10	0 34 55	0 37 48	0 40 49	0 44 2	0 47 22	0 50 53	0 54 32	0 58 20	1 2 18	1 6 25	1 10 39	1 15 4	1 19 33	1 24 17

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	2 39 30	2 53 4	3 6 44	3 20 25	3 34 13	3 48 19	4 2 22	4 16 27	4 30 28	4 44 57	4 59 15	5 13 31	5 27 51	5 42 27	5 56 52
1	2 11 8	2 23 22	2 35 42	2 48 14	3 0 59	3 13 56	3 27 1	3 40 18	3 53 40	4 7 11	4 20 42	4 34 20	4 48 2	5 1 59	5 15 48
2	1 50 33	2 1 24	2 12 25	2 23 41	2 35 16	2 47 7	2 59 11	3 11 21	3 23 43	3 36 22	3 49 1	4 1 50	4 14 44	4 27 55	4 41 5
3	1 35 16	1 44 52	1 54 43	2 4 52	2 15 21	2 26 3	2 37 3	2 48 15	2 59 31	3 11 19	3 23 3	3 35 0	3 47 7	3 59 29	4 11 48
4	1 23 42	1 32 16	1 41 3	1 50 11	1 59 22	2 9 24	2 19 23	2 29 36	2 40 3	2 50 50	3 1 43	3 12 45	3 24 2	3 35 36	3 47 13
5	1 14 42	1 22 22	1 30 18	1 38 34	1 47 4	1 55 45	2 5 6	2 14 26	2 24 1	2 33 55	2 43 59	2 54 18	3 4 48	3 15 30	3 26 23
6	1 7 39	1 14 28	1 21 38	1 29 8	1 36 54	1 44 57	1 53 25	2 1 57	2 10 48	2 19 55	2 29 15	2 38 46	2 48 32	2 58 33	3 8 40
7	1 1 53	1 8 8	1 14 39	1 21 31	1 28 35	1 36 4	1 43 40	1 51 31	1 59 43	2 8 12	2 16 45	2 25 36	2 34 42	2 44 1	2 53 29
8	0 57 5	1 2 51	1 8 49	1 15 0	1 21 33	1 28 22	1 35 27	1 42 48	1 50 20	1 58 7	2 6 10	2 14 26	2 22 51	2 31 27	2 40 27
9	0 53 6	0 58 22	1 3 50	1 9 34	1 15 40	1 21 57	1 28 30	1 35 18	1 42 17	1 49 32	1 57 3	2 4 46	2 12 38	2 20 38	2 29 2
10	0 49 41	0 54 34	0 59 40	1 5 0	1 10 35	1 16 23	1 23 27	1 28 47	1 35 21	1 42 7	1 49 9	1 56 17	2 3 39	2 11 18	2 19 10
11	0 46 43	0 51 13	0 55 58	1 0 54	1 6 9	1 11 35	1 17 16	1 23 10	1 29 18	1 35 37	1 42 10	1 48 54	1 55 52	2 2 58	2 10 20
12	0 44 22	0 48 33	0 52 57	0 57 31	1 2 25	1 7 32	1 12 50	1 18 21	1 24 4	1 29 56	1 36 5	1 42 25	1 48 57	1 55 42	2 2 38
13	0 42 2	0 46 3	0 50 10	0 54 31	0 59 9	1 3 47	1 8 45	1 13 56	1 19 23	1 24 53	1 30 38	1 36 36	1 42 43	1 49 3	1 55 32
14	0 39 58	0 43 39	0 47 36	0 51 40	0 55 56	1 0 27	1 5 11	1 10 2	1 15 6	1 20 23	1 25 49	1 31 29	1 37 19	1 43 19	1 49 30
15	0 38 18	0 41 48	0 45 30	0 49 21	0 53 24	0 57 39	1 2 4	1 6 41	1 11 29	1 16 22	1 21 32	1 26 54	1 32 26	1 38 8	1 43 59
16	0 36 40	0 39 58	0 43 26	0 47 5	0 50 54	0 54 54	0 59 17	1 3 30	1 8 3	1 12 48	1 17 4	1 22 45	1 27 57	1 33 23	1 38 59
17	0 35 18	0 38 27	0 41 41	0 45 10	0 48 47	0 52 36	0 56 34	1 0 44	1 5 3	1 9 32	1 14 11	1 19 0	1 23 53	1 29 2	1 34 18
18	0 33 58	0 36 56	0 40 1	0 43 19	0 46 44	0 50 23	0 54 10	0 58 6	1 2 12	1 6 29	1 0 54	1 15 27	1 20 11	1 25 5	1 30 9
19	0 32 49	0 35 39	0 38 34	0 41 40	0 44 57	0 48 25	0 52 0	0 55 46	0 59 40	1 3 46	1 7 58	1 12 21	1 16 53	1 21 33	1 26 22
20	0 31 40	0 34 21	0 37 11	0 40 11	0 43 20	0 46 38	0 50 3	0 53 39	0 57 24	1 1 16	1 5 16	1 9 27	1 13 43	1 18 11	1 22 47
21	0 30 44	0 33 17	0 35 57	0 38 48	0 41 46	0 44 57	0 48 14	0 51 39	0 55 13	0 58 57	1 2 47	1 6 45	1 10 51	1 15 6	1 19 30
22	0 29 47	0 32 13	0 34 47	0 37 28	0 40 22	0 43 22	0 46 30	0 49 41	0 53 6	0 56 39	1 0 22	1 4 11	1 8 9	1 12 7	1 16 25
23	0 28 55	0 31 17	0 33 44	0 36 19	0 39 3	0 41 56	0 44 55	0 48 3	0 51 17	0 54 42	0 58 13	1 1 53	1 5 42	1 9 35	1 13 39

LATITUDE 2° NORTH OR SOUTH.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	6 11 22	6 25 50	6 40 32	6 55 4	7 9 42	7 24 17	7 38 58	7 53 50	8 8 19	8 22 57	8 37 44	8 52 27	9 7 11	9 21 51	9 36 42
1	5 29 45	5 43 45	5 57 53	6 11 55	6 26 4	6 40 18	6 54 39	7 8 54	7 23 12	7 37 32	7 51 47	8 6 20	8 20 43	8 35 12	8 49 43
2	4 54 22	5 7 44	5 21 13	5 34 43	5 48 18	6 1 58	6 15 45	6 29 33	6 43 24	6 57 17	7 11 14	7 25 13	7 39 14	7 53 18	8 7 28
3	4 24 23	4 36 59	4 49 48	5 2 41	5 15 37	5 28 41	5 41 51	5 55 4	6 8 24	6 21 45	6 35 16	6 48 44	7 2 17	7 15 52	7 29 36
4	3 58 58	4 10 54	4 22 55	4 35 7	4 47 26	4 59 51	5 12 25	5 25 0	5 37 44	5 50 33	6 3 28	6 16 25	6 29 28	6 42 34	6 55 50
5	3 37 25	3 48 37	4 0 0	4 11 27	4 23 3	4 34 49	4 46 46	4 58 45	5 10 53	5 23 1	5 35 25	5 47 49	6 0 19	6 12 52	6 25 36
6	3 18 48	3 29 27	3 40 7	3 50 55	4 1 54	4 12 59	4 24 17	4 35 40	4 47 12	4 58 51	5 10 36	5 22 25	5 34 22	5 46 26	5 58 40
7	3 3 9	3 12 57	3 23 0	3 33 13	3 43 37	3 54 2	4 4 47	4 15 30	4 26 25	4 37 27	4 48 48	4 59 55	5 11 30	5 22 50	5 34 33
8	2 49 25	2 58 42	3 8 6	3 17 40	3 27 26	3 37 21	3 47 27	3 57 40	4 8 1	4 18 31	4 29 10	4 39 55	4 50 55	5 1 46	5 12 53
9	2 37 28	2 46 12	2 55 4	3 4 6	3 13 18	3 22 39	3 32 12	3 41 52	3 51 42	4 1 41	4 11 47	4 21 59	4 32 30	4 42 51	4 53 28
10	2 27 8	2 35 17	2 43 39	2 52 12	3 0 54	3 9 44	3 18 45	3 27 55	3 37 43	3 47 40	3 56 46	4 6 0	4 15 53	4 25 55	4 36 3
11	2 17 51	2 25 34	2 33 25	2 41 30	2 49 41	2 58 5	3 6 37	3 15 19	3 24 10	3 33 10	3 42 18	3 51 35	4 0 59	4 10 32	4 20 12
12	2 9 42	2 16 54	2 24 24	2 32 0	2 39 46	2 47 43	2 55 51	3 4 5	3 12 28	3 21 3	3 29 45	3 38 35	3 47 34	3 56 39	4 5 53
13	2 2 26	2 9 17	2 16 19	2 23 31	2 30 53	2 38 27	2 46 11	2 53 59	3 1 59	3 10 8	3 18 26	3 26 49	3 35 24	3 44 5	3 52 56
14	1 55 52	2 2 24	2 9 4	2 15 55	2 22 56	2 30 5	2 37 24	2 44 53	2 52 29	3 0 14	3 8 7	3 16 10	3 24 24	3 32 39	3 41 6
15	1 49 7	1 55 16	2 1 32	2 8 0	2 14 35	2 21 22	2 28 16	2 35 20	2 42 31	2 49 52	2 57 20	3 4 57	3 12 30	3 20 35	3 28 34
16	1 44 42	1 50 35	1 56 39	2 2 58	2 9 20	2 15 52	2 22 30	2 29 18	2 36 14	2 43 18	2 50 29	2 57 49	3 5 17	3 12 52	3 20 34
17	1 39 46	1 45 22	1 51 9	1 57 4	2 3 7	2 9 18	2 15 38	2 22 6	2 28 43	2 35 28	2 42 21	2 49 23	2 56 32	3 3 47	3 11 11
18	1 35 16	1 40 34	1 46 3	1 51 41	1 57 27	2 3 22	2 9 24	2 15 35	2 21 55	2 28 22	2 34 58	2 41 43	2 48 33	2 55 29	3 2 36
19	1 31 18	1 36 19	1 41 35	1 46 58	1 52 29	1 58 8	2 3 41	2 9 51	2 15 53	2 22 4	2 28 23	2 34 49	2 41 22	2 48 5	2 54 55
20	1 27 29	1 32 21	1 37 25	1 42 32	1 47 48	1 53 13	1 58 45	2 4 27	2 10 15	2 16 11	2 22 14	2 28 24	2 34 43	2 41 8	2 47 41
21	1 24 1	1 28 30	1 33 18	1 38 13	1 43 18	1 48 38	1 53 56	1 59 25	2 5 1	2 10 41	2 16 20	2 22 26	2 28 30	2 34 39	2 40 57
22	1 20 45	1 25 14	1 29 50	1 34 34	1 39 25	1 44 25	1 49 32	1 54 48	2 0 11	2 5 39	2 11 12	2 16 53	2 22 39	2 28 30	2 34 33
23	1 17 48	1 21 59	1 26 23	1 30 54	1 35 32	1 40 20	1 45 16	1 50 17	1 55 25	2 0 38	2 6 8	2 11 36	2 17 9	2 22 51	2 28 41

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	9 51 28	10 6 13	10 20 58	10 35 49	10 50 37	11 5 25	11 20 13	11 35 4	11 49 54	12 4 45	12 19 34	12 34 27	12 49 17	13 4 9	13 18 57
1	9 4 12	9 18 42	9 33 20	9 47 50	10 2 25	10 16 56	10 31 33	10 46 13	11 0 50	11 15 29	11 29 58	11 44 49	11 59 31	12 14 11	12 28 51
2	8 21 35	8 35 44	8 49 58	9 4 13	9 18 29	9 32 45	9 47 4	10 1 28	10 15 48	10 30 12	10 44 37	10 59 3	11 13 30	11 27 56	11 42 27
3	7 43 19	7 57 5	8 10 55	8 24 44	8 38 40	8 52 37	9 6 36	9 20 37	9 34 40	9 48 44	10 2 50	10 16 55	10 31 6	10 45 19	10 59 33
4	7 9 5	7 22 21	7 35 43	7 49 12	8 2 41	8 16 11	8 29 45	8 43 27	8 57 5	9 10 48	9 24 33	9 38 23	9 52 12	10 0 5	10 19 57
5	6 38 20	6 51 11	7 4 6	7 17 3	7 30 4	7 43 12	7 56 22	8 9 38	8 22 51	8 36 12	8 49 35	9 3 0	9 16 28	9 29 58	9 43 33
6	6 10 27	6 23 10	6 35 35	6 48 6	7 0 40	7 13 18	7 26 0	7 38 49	7 51 40	8 4 35	8 17 32	8 30 36	8 43 39	8 56 47	9 10 0
7	5 46 14	5 58 4	6 9 59	6 21 57	6 33 59	6 46 14	6 58 31	7 10 57	7 23 18	7 35 48	7 48 18	8 0 58	8 13 37	8 26 21	8 39 10
8	5 24 7	5 35 23	5 46 52	5 58 24	6 10 3	6 21 47	6 33 32	6 45 28	6 57 26	7 9 27	7 21 33	7 33 46	7 46 2	7 58 22	8 10 46
9	5 4 12	5 14 59	5 25 58	5 37 1	5 48 11	5 59 30	6 10 50	6 22 17	6 33 46	6 45 23	6 57 4	7 8 52	7 20 42	7 32 39	7 44 39
10	4 46 17	4 56 38	5 7 8	5 17 44	5 28 26	5 39 15	5 50 8	6 1 13	6 12 15	6 23 26	6 34 42	6 46 5	6 57 31	7 9 0	7 20 39
11	4 29 59	4 39 55	4 49 57	5 0 6	5 10 22	5 20 43	5 31 12	5 41 46	5 52 27	6 3 13	6 14 5	6 25 1	6 36 4	6 47 12	6 58 24
12	4 15 15	4 24 44	4 34 20	4 44 5	4 53 54	5 3 51	5 13 52	5 24 6	5 34 21	5 44 41	5 55 8	6 5 42	6 16 20	6 27 5	6 37 54
13	4 1 54	4 10 58	4 20 9	4 29 27	4 38 52	4 48 26	4 58 5	5 7 52	5 17 42	5 27 40	5 37 45	5 47 56	5 58 11	6 8 32	6 18 58
14	3 49 40	3 58 20	4 7 10	4 16 11	4 25 8	4 34 17	4 43 34	4 52 57	5 2 13	5 12 0	5 21 42	5 31 29	5 41 22	5 51 21	6 1 25
15	3 36 42	3 44 58	3 53 21	4 1 50	4 10 28	4 19 11	4 28 0	4 36 58	4 46 1	4 55 10	5 4 26	5 13 47	5 23 15	5 33 48	5 44 44
16	3 28 24	3 36 20	3 44 27	3 52 34	4 0 52	4 9 18	4 17 52	4 26 31	4 35 15	4 44 5	4 52 1	5 2 6	5 11 19	5 20 34	5 29 52
17	3 18 43	3 26 22	3 34 9	3 42 2	3 50 2	3 58 8	4 6 20	4 14 38	4 23 3	4 31 38	4 40 20	4 49 4	4 57 52	5 6 46	5 15 46
18	3 9 49	3 17 8	3 24 34	3 32 6	3 39 47	3 47 35	3 55 32	4 3 33	4 11 38	4 19 50	4 28 9	4 36 34	4 45 3	4 53 38	5 2 20
19	3 1 51	3 8 54	3 16 3	3 23 19	3 30 41	3 38 12	3 45 49	3 53 32	4 1 22	4 9 16	4 17 16	4 25 24	4 33 35	4 41 53	4 50 18
20	2 54 20	3 1 6	3 7 59	3 14 58	3 22 4	3 29 16	3 36 35	3 44 1	3 51 33	3 59 11	4 6 55	4 14 45	4 22 41	4 30 43	4 38 51
21	2 47 22	2 53 53	3 0 29	3 7 12	3 14 2	3 20 58	3 28 0	3 35 8	3 42 22	3 49 42	4 7 7	4 4 39	4 12 20	4 20 4	4 27 54
22	2 40 44	2 47 1	2 53 24	2 59 52	3 6 26	3 13 9	3 19 55	3 26 51	3 33 48	3 40 58	3 48 7	3 55 21	4 2 49	4 10 15	4 17 55
23	2 34 37	2 40 38	2 46 47	2 53 3	2 59 24	3 5 51	3 12 25	3 19 3	3 25 48	3 32 15	3 39 11	3 46 11	3 53 29	4 0 44	4 8 6

LATITUDE 3° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 11 43	0 13 37	0 16 37	0 20 42	0 26 19	0 32 26	0 39 34	0 47 52	0 56 19	1 5 33	1 15 18	1 25 38	1 36 35	1 47 43	1 59 15
1	0 11 53	0 14 46	0 19 13	0 25 0	0 32 48	0 41 13	0 50 42	1 0 47	1 11 52	1 23 18	1 35 3	1 47 24	2 0 12	2 12 53	2 26 0
2	0 12 49	0 18 14	0 25 53	0 35 44	0 47 35	0 59 29	1 11 50	1 24 58	1 38 56	1 52 45	2 6 45	2 20 40	2 35 5	2 49 27	3 3 54
3	Not calculable.														
4	0 12 49	0 18 14	0 25 52	0 35 40	0 47 24	0 59 24	1 11 50	1 24 43	1 38 49	1 52 41	2 6 38	2 20 34	2 34 55	2 49 14	3 3 44
5	0 11 53	0 14 46	0 19 13	0 25 1	0 32 45	0 40 59	0 50 34	1 0 43	1 11 42	1 22 55	1 34 48	1 47 3	1 59 47	2 12 34	2 25 41
6	0 11 44	0 13 39	0 16 35	0 20 43	0 26 0	0 32 21	0 39 24	0 47 17	0 56 0	1 5 12	1 14 53	1 25 19	1 36 5	1 47 17	1 58 46
7	0 11 40	0 13 6	0 15 22	0 18 31	0 22 42	0 27 26	0 32 58	0 39 16	0 46 21	0 53 54	1 2 7	1 10 44	1 19 57	1 29 33	1 39 34
8	0 11 36	0 12 39	0 14 27	0 16 56	0 20 16	0 24 15	0 28 47	0 33 59	0 39 48	0 46 14	0 53 10	1 0 34	1 8 32	1 16 45	1 25 28
9	0 11 28	0 12 24	0 13 55	0 16 1	0 18 47	0 22 9	0 25 1	0 30 25	0 35 23	0 40 47	0 46 45	0 53 12	1 0 2	1 7 19	1 14 58
10	0 11 27	0 12 8	0 13 31	0 15 21	0 17 40	0 20 33	0 23 51	0 27 41	0 32 0	0 36 47	0 41 56	0 47 35	0 53 36	1 0 4	1 6 50
11	0 11 22	0 12 3	0 13 10	0 14 47	0 16 51	0 19 22	0 22 16	0 25 39	0 29 26	0 33 38	0 38 14	0 43 14	0 48 36	0 54 21	1 0 25
12	0 11 19	0 11 52	0 12 53	0 14 19	0 16 12	0 18 27	0 20 58	0 23 56	0 27 25	0 31 11	0 35 17	0 39 44	0 44 38	0 49 47	0 55 15
13	0 11 17	0 11 46	0 12 41	0 13 56	0 15 39	0 17 37	0 19 55	0 22 38	0 25 42	0 29 9	0 32 51	0 36 52	0 41 17	0 45 57	0 50 58
14	0 11 16	0 11 43	0 12 33	0 13 41	0 15 16	0 16 58	0 19 9	0 21 36	0 24 26	0 27 30	0 30 51	0 34 34	0 38 37	0 42 53	0 47 27
15	0 11 14	0 11 40	0 12 24	0 13 26	0 14 50	0 16 30	0 18 27	0 20 42	0 23 14	0 26 4	0 29 12	0 32 35	0 36 16	0 40 13	0 44 29
16	0 11 12	0 11 34	0 12 13	0 13 11	0 14 27	0 15 57	0 17 47	0 19 51	0 22 12	0 24 51	0 27 42	0 30 52	0 34 13	0 37 52	0 41 48
17	0 11 10	0 11 34	0 12 14	0 13 6	0 14 14	0 15 40	0 17 15	0 19 15	0 21 25	0 23 50	0 26 30	0 29 28	0 32 31	0 35 59	0 39 35
18	0 11 8	0 11 30	0 12 6	0 12 56	0 14 1	0 15 15	0 16 49	0 18 36	0 20 37	0 22 57	0 25 24	0 28 23	0 31 2	0 34 10	0 37 37
19	0 11 5	0 11 22	0 12 3	0 12 46	0 13 49	0 14 59	0 16 24	0 18 4	0 19 56	0 22 6	0 24 28	0 27 0	0 29 40	0 32 40	0 35 51
20	0 11 3	0 11 20	0 11 56	0 12 38	0 13 34	0 14 40	0 16 2	0 17 40	0 19 22	0 21 23	0 23 33	0 25 57	0 28 30	0 31 19	0 34 17
21	0 11 3	0 11 19	0 11 51	0 12 31	0 13 25	0 14 28	0 15 42	0 17 13	0 18 53	0 20 47	0 22 49	0 25 5	0 27 27	0 30 7	0 32 54
22	0 11 0	0 11 16	0 11 45	0 12 22	0 13 15	0 14 13	0 15 27	0 16 49	0 18 22	0 20 12	0 22 6	0 24 15	0 26 30	0 29 3	0 31 39
23	0 10 59	0 11 14	0 11 39	0 12 16	0 13 6	0 14 2	0 15 11	0 16 28	0 17 59	0 19 38	0 21 27	0 23 27	0 25 39	0 27 59	0 30 30

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 11 43	0 13 37	0 16 37	0 20 42	0 26 19	0 32 26	0 39 34	0 47 52	0 56 19	1 5 33	1 15 18	1 25 38	1 36 35	1 47 43	1 59 15
1	0 11 37	0 12 56	0 15 20	0 18 29	0 22 42	0 27 35	0 33 3	0 39 28	0 46 41	0 54 14	1 2 27	1 11 7	1 20 28	1 30 0	1 40 4
2	0 11 31	0 12 38	0 14 29	0 16 56	0 20 29	0 24 23	0 28 56	0 34 10	0 40 13	0 46 37	0 53 34	1 0 55	1 9 0	1 17 20	1 26 3
3	0 11 27	0 12 23	0 13 52	0 15 58	0 18 53	0 22 13	0 26 4	0 30 33	0 35 40	0 41 9	0 47 3	0 53 37	1 0 37	1 7 54	1 15 37
4	0 11 24	0 12 14	0 13 32	0 15 22	0 17 47	0 20 40	0 24 1	0 27 50	0 32 20	0 37 5	0 42 23	0 48 0	0 54 13	1 0 40	1 7 35
5	0 11 21	0 12 0	0 13 14	0 14 47	0 16 57	0 19 30	0 22 29	0 25 49	0 29 45	0 33 57	0 38 39	0 43 41	0 49 9	0 54 57	1 1 8
6	0 11 19	0 11 54	0 12 53	0 14 25	0 16 19	0 18 35	0 21 13	0 24 15	0 27 43	0 31 33	0 35 41	0 40 15	0 45 12	0 50 26	0 56 0
7	0 11 17	0 11 49	0 12 45	0 14 1	0 15 46	0 17 46	0 20 12	0 22 53	0 26 1	0 29 30	0 33 18	0 37 24	0 41 46	0 46 40	0 51 39
8	0 11 15	0 11 45	0 12 36	0 13 46	0 15 20	0 17 11	0 19 22	0 21 50	0 24 41	0 27 50	0 31 19	0 35 5	0 39 8	0 43 35	0 48 9
9	0 11 13	0 11 43	0 12 28	0 13 32	0 14 57	0 16 39	0 18 39	0 20 58	0 23 34	0 26 25	0 29 35	0 33 2	0 37 47	0 40 56	0 45 8
10	0 11 11	0 11 38	0 12 21	0 13 20	0 14 37	0 16 12	0 18 1	0 20 10	0 22 35	0 25 15	0 28 11	0 31 23	0 34 52	0 38 37	0 42 39
11	0 11 9	0 11 32	0 12 10	0 13 7	0 14 18	0 15 46	0 17 27	0 19 26	0 21 40	0 24 9	0 26 54	0 29 54	0 33 7	0 36 35	0 40 17
12	0 11 7	0 11 29	0 12 5	0 12 53	0 14 3	0 15 25	0 17 1	0 18 51	0 20 56	0 23 16	0 25 50	0 28 39	0 31 42	0 34 59	0 38 30
13	0 11 5	0 11 26	0 11 59	0 12 50	0 13 54	0 15 8	0 16 40	0 18 20	0 20 18	0 22 28	0 24 50	0 27 28	0 30 19	0 33 21	0 36 39
14	0 11 4	0 11 23	0 11 55	0 12 41	0 13 40	0 14 51	0 16 11	0 17 48	0 19 40	0 21 41	0 23 58	0 26 29	0 29 11	0 32 2	0 35 4
15	0 11 1	0 11 20	0 11 49	0 12 33	0 13 29	0 14 36	0 15 55	0 17 23	0 19 9	0 21 5	0 23 13	0 25 33	0 28 4	0 30 47	0 33 42
16	0 10 59	0 11 19	0 11 45	0 12 27	0 13 18	0 14 24	0 15 36	0 17 1	0 18 42	0 20 28	0 22 32	0 24 43	0 27 8	0 29 40	0 32 25
17	0 10 58	0 11 15	0 11 42	0 12 21	0 13 12	0 14 13	0 15 22	0 16 44	0 18 16	0 19 57	0 21 53	0 23 57	0 26 13	0 28 42	0 31 19
18	0 10 57	0 11 13	0 11 38	0 12 15	0 13 0	0 13 58	0 15 8	0 16 24	0 17 53	0 19 31	0 21 19	0 23 19	0 25 29	0 27 46	0 30 15
19	0 10 56	0 11 11	0 11 35	0 12 11	0 12 56	0 13 48	0 14 54	0 16 7	0 17 33	0 19 7	0 20 50	0 22 40	0 24 43	0 26 55	0 29 18
20	0 10 55	0 11 8	0 11 31	0 12 4	0 12 46	0 13 37	0 14 40	0 15 49	0 17 8	0 18 38	0 20 17	0 22 5	0 24 2	0 26 7	0 28 23
21	0 10 54	0 11 7	0 11 29	0 12 1	0 12 41	0 13 32	0 14 29	0 15 36	0 16 53	0 18 17	0 19 50	0 21 32	0 23 27	0 25 27	0 27 36
22	0 10 52	0 11 5	0 11 25	0 11 56	0 12 34	0 13 22	0 14 19	0 15 24	0 16 36	0 17 57	0 19 26	0 21 4	0 22 52	0 24 47	0 26 49
23	0 10 49	0 11 2	0 11 22	0 11 51	0 12 29	0 13 14	0 14 8	0 15 10	0 16 19	0 17 38	0 19 2	0 20 36	0 22 19	0 24 10	0 26 8

LATITUDE 3° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	2 11 5	2 23 17	2 35 40	2 48 6	3 0 54	3 13 51	3 26 56	3 40 8	3 53 33	4 7 4	4 20 35	4 34 12	4 47 54	5 1 50	5 15 42
1	2 39 25	2 52 57	3 6 38	3 20 16	3 34 3	3 48 5	4 2 11	4 16 16	4 30 27	4 44 45	4 59 1	5 13 21	5 27 42	5 42 15	5 56 42
2	3 18 20	3 32 56	3 47 37	4 2 10	4 16 48	4 31 39	4 46 24	5 1 3	5 15 37	5 30 40	5 45 29	6 0 14	6 14 57	6 29 53	6 44 47
3	Not calculable.														
4	3 18 1	3 32 42	3 47 20	4 1 54	4 16 34	4 31 17	4 46 0	5 0 42	5 15 30	5 30 17	5 45 4	5 59 53	6 14 40	6 29 31	6 44 22
5	2 38 53	2 52 27	3 6 3	3 19 4	3 33 35	3 47 32	4 1 35	4 15 38	4 29 48	4 44 0	4 58 21	5 12 26	5 26 52	5 41 27	5 55 51
6	2 10 38	2 22 41	2 34 56	2 47 32	3 0 13	3 13 15	3 26 13	3 39 25	3 52 42	4 6 9	4 19 37	4 33 15	4 46 54	5 0 45	5 14 30
7	1 49 55	2 0 44	2 12 0	2 22 55	2 34 25	2 46 16	2 58 9	3 10 18	3 22 38	3 35 8	3 47 47	4 0 32	4 13 27	4 26 29	4 39 38
8	1 34 35	1 44 7	1 53 53	2 3 57	2 14 20	2 24 59	2 35 52	2 47 3	2 58 24	3 10 1	3 21 42	3 33 35	3 45 37	3 57 51	4 10 10
9	1 23 2	1 31 27	1 40 12	1 49 15	1 58 39	2 8 18	2 18 12	2 28 22	2 38 47	2 49 24	3 1 14	3 11 15	3 22 27	3 33 50	3 45 21
10	1 13 56	1 21 40	1 29 28	1 37 19	1 46 0	1 54 46	2 3 50	2 12 58	2 22 38	2 32 22	2 42 25	2 52 30	3 2 58	3 13 17	3 24 25
11	1 6 52	1 13 37	1 20 45	1 28 8	1 35 49	1 43 46	1 52 3	2 0 33	2 9 19	2 18 19	2 27 32	2 36 59	2 46 37	2 56 27	3 6 33
12	1 1 6	1 6 14	1 13 43	1 20 39	1 27 28	1 34 45	1 42 20	1 50 9	1 58 13	2 6 35	2 14 59	2 23 46	2 32 45	2 41 59	2 51 21
13	0 56 17	1 1 55	1 7 47	1 13 54	1 20 23	1 27 8	1 34 0	1 41 16	1 48 43	1 56 28	2 4 7	2 12 24	2 20 45	2 29 20	2 38 5
14	0 52 19	0 57 28	1 2 55	1 8 34	1 14 28	1 20 39	1 27 9	1 33 47	1 40 40	1 47 49	1 55 14	2 2 47	2 10 33	2 18 30	2 26 41
15	0 48 54	0 53 40	0 58 42	1 3 55	1 9 25	1 15 9	1 21 9	1 27 19	1 33 46	1 40 25	1 47 21	1 54 20	2 1 35	2 9 3	2 16 42
16	0 45 54	0 50 22	0 55 2	0 59 54	1 5 2	1 10 21	1 15 56	1 21 42	1 27 41	1 33 54	1 40 18	1 46 56	1 53 42	2 0 43	2 7 54
17	0 43 25	0 47 33	0 51 55	0 56 24	1 1 12	1 6 11	1 11 23	1 16 47	1 22 22	1 28 12	1 34 11	1 40 24	1 46 49	1 53 24	2 0 11
18	0 41 11	0 45 3	0 49 3	0 53 19	0 57 47	1 2 31	1 7 23	1 12 24	1 17 38	1 23 9	1 28 47	1 34 38	1 40 40	1 46 53	1 53 16
19	0 39 15	0 42 51	0 46 39	0 50 51	0 54 49	0 59 11	1 3 45	1 8 31	1 13 29	1 18 41	1 23 57	1 29 27	1 35 12	1 41 5	1 47 3
20	0 37 29	0 40 52	0 44 28	0 48 10	0 52 5	0 56 15	1 0 33	1 5 4	1 9 44	1 14 36	1 19 36	1 24 51	1 30 12	1 35 45	1 41 28
21	0 35 54	0 39 6	0 42 28	0 45 59	0 49 41	0 53 36	0 57 41	1 1 57	1 6 21	1 10 59	1 15 42	1 20 38	1 25 45	1 31 1	1 36 26
22	0 34 27	0 37 31	0 40 42	0 44 1	0 47 33	0 51 13	0 55 6	0 59 7	1 3 18	1 7 41	1 12 9	1 16 49	1 21 41	1 26 42	1 31 47
23	0 33 11	0 36 3	0 39 4	0 42 12	0 45 34	0 49 4	0 52 43	0 56 32	1 0 30	1 4 38	1 8 56	1 13 21	1 17 57	1 22 37	1 27 33

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	2 11 5	2 23 17	2 35 40	2 48 6	3 0 54	3 13 51	3 26 56	3 40 8	3 53 33	4 7 4	4 20 35	4 34 12	4 47 54	5 1 50	5 15 42
1	1 50 33	2 1 24	2 12 25	2 23 41	2 35 15	2 47 7	2 59 11	3 11 21	3 23 42	3 36 21	3 48 59	4 1 50	4 14 43	4 27 53	4 41 2
2	1 35 16	1 44 52	1 54 43	2 4 52	2 15 21	2 26 3	2 37 3	2 48 15	2 59 31	3 11 19	3 23 3	3 35 0	3 47 7	3 57 29	4 11 48
3	1 23 43	1 32 17	1 41 5	1 50 14	1 59 40	2 9 27	2 19 27	2 29 39	2 40 6	2 50 51	3 1 46	3 12 47	3 24 3	3 35 38	3 47 15
4	1 14 45	1 22 25	1 30 22	1 38 36	1 47 7	1 56 0	2 5 8	2 14 29	2 24 9	2 33 58	2 44 3	2 54 22	3 2 54	3 15 36	3 26 29
5	1 7 41	1 14 31	1 21 41	1 29 12	1 36 57	1 45 2	1 53 27	2 2 2	2 10 56	2 19 58	2 29 22	2 38 52	2 48 39	2 58 30	3 8 48
6	1 1 56	1 8 11	1 14 42	1 21 34	1 28 40	1 36 9	1 43 47	1 51 43	1 59 51	2 8 20	2 16 55	2 25 48	2 34 53	2 44 13	2 53 40
7	0 57 8	1 2 58	1 9 4	1 15 46	1 21 39	1 28 33	1 35 34	1 42 53	1 50 27	1 58 21	2 6 19	2 14 35	2 23 0	2 31 44	2 40 36
8	0 53 10	0 58 28	1 3 57	1 9 40	1 15 44	1 22 3	1 28 38	1 35 28	1 42 28	1 49 44	1 57 16	2 5 3	2 12 59	2 20 56	2 29 17
9	0 49 47	0 54 40	0 59 44	1 5 4	1 10 45	1 16 34	1 22 39	1 29 1	1 35 32	1 42 18	1 49 20	1 56 34	2 3 56	2 11 27	2 19 22
10	0 46 50	0 51 23	0 56 8	1 1 8	1 6 20	1 11 46	1 17 27	1 23 21	1 29 31	1 35 53	1 42 28	1 49 13	1 56 8	2 3 18	2 10 40
11	0 44 16	0 48 28	0 52 56	0 57 35	1 2 27	1 7 32	1 12 52	1 18 25	1 24 10	1 30 9	1 36 17	1 42 39	1 49 12	1 55 57	2 2 52
12	0 42 11	0 46 7	0 50 14	0 54 34	0 59 10	1 3 59	1 8 58	1 14 10	1 19 33	1 25 9	1 30 55	1 36 55	1 43 7	1 49 32	1 56 4
13	0 40 9	0 43 55	0 47 47	0 51 53	0 56 15	1 0 39	1 5 20	1 10 14	1 15 25	1 20 35	1 26 2	1 31 41	1 37 29	1 43 30	1 49 39
14	0 38 20	0 41 49	0 45 32	0 49 21	0 53 24	0 57 41	1 2 10	1 6 47	1 11 36	1 16 41	1 21 47	1 27 10	1 32 43	1 38 26	1 44 20
15	0 36 48	0 40 7	0 43 38	0 47 17	0 51 8	0 55 10	0 59 22	1 3 45	1 8 19	1 12 59	1 17 52	1 22 59	1 28 15	1 33 41	1 39 15
16	0 35 20	0 38 29	0 41 46	0 45 15	0 48 53	0 52 41	0 56 42	1 0 53	1 5 13	1 9 45	1 14 24	1 19 14	1 24 12	1 29 24	1 34 45
17	0 34 6	0 37 6	0 40 11	0 43 30	0 46 57	0 50 36	0 54 23	0 58 22	1 2 29	1 6 46	1 11 13	1 15 49	1 20 27	1 25 23	1 30 25
18	0 32 54	0 35 43	0 38 41	0 41 50	0 45 7	0 48 36	0 52 11	0 55 58	0 59 53	1 3 59	1 8 13	1 12 35	1 17 6	1 21 48	1 26 39
19	0 31 50	0 34 33	0 37 21	0 40 19	0 43 28	0 46 47	0 50 13	0 53 50	0 57 34	1 1 30	1 5 31	1 9 43	1 14 4	1 18 33	1 23 11
20	0 30 47	0 33 21	0 36 4	0 38 57	0 41 58	0 45 9	0 48 25	0 51 52	0 55 28	0 59 12	1 3 3	1 7 4	1 11 9	1 15 27	1 19 52
21	0 29 55	0 32 22	0 34 56	0 37 40	0 40 31	0 43 35	0 46 44	0 50 1	0 53 27	0 57 3	1 0 44	1 4 34	1 8 30	1 12 36	1 16 51
22	0 29 3	0 31 23	0 33 52	0 36 27	0 39 14	0 42 8	0 45 8	0 48 13	0 51 31	0 54 56	0 58 31	1 2 11	1 6 1	1 9 50	1 13 59
23	0 28 14	0 30 31	0 32 53	0 35 22	0 38 0	0 40 47	0 43 40	0 46 42	0 49 49	0 53 7	0 56 30	1 0 3	1 3 40	1 7 29	1 11 25

LATITUDE 3° NORTH OR SOUTH.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	5 29 40	5 43 38	5 57 44	6 11 46	6 25 55	6 40 8	6 54 28	7 8 44	7 22 59	7 37 21	7 51 46	8 6 9	8 20 32	8 34 58	8 49 30
1	4 54 21	5 7 43	5 21 11	5 34 41	5 48 17	6 1 56	6 15 42	6 29 30	6 43 20	6 57 12	7 11 10	7 25 6	7 39 6	7 53 13	8 7 23
2	4 24 23	4 36 59	4 49 48	5 2 41	5 15 37	5 28 41	5 41 51	5 55 4	6 8 24	6 21 45	6 35 16	6 48 44	7 2 17	7 15 52	7 29 36
3	3 59 1	4 10 56	4 22 59	4 35 12	4 47 31	4 59 54	5 12 29	5 25 3	5 37 49	5 50 37	6 3 33	6 16 30	6 29 33	6 42 40	6 55 54
4	3 37 41	3 48 52	4 0 6	4 11 33	4 23 12	4 34 57	4 46 54	4 58 54	5 11 2	5 23 12	5 35 34	5 47 58	6 0 29	6 13 2	6 25 46
5	3 19 7	3 29 35	3 40 18	3 51 7	4 2 4	4 13 13	4 24 29	4 35 51	4 47 24	4 59 1	5 10 49	5 22 38	5 34 36	5 46 40	5 58 51
6	3 3 21	3 13 11	3 23 14	3 33 26	3 43 47	3 54 19	4 4 59	4 15 44	4 26 41	4 37 44	4 48 59	5 0 16	5 11 40	5 23 12	5 34 52
7	2 49 42	2 58 55	3 8 20	3 17 55	3 27 46	3 37 37	3 47 48	3 57 57	4 8 19	4 18 47	4 29 38	4 40 14	4 51 19	5 2 9	5 13 22
8	2 37 42	2 46 28	2 55 22	3 4 25	3 13 38	3 22 59	3 32 35	3 42 17	3 52 5	4 2 4	4 12 12	4 22 26	4 32 57	4 43 19	4 53 57
9	2 27 17	2 35 33	2 43 56	2 52 28	3 1 16	3 10 2	3 19 11	3 28 15	3 37 35	3 47 5	3 56 44	4 6 28	4 16 30	4 26 23	4 36 32
10	2 18 11	2 25 53	2 33 47	2 41 52	2 50 5	2 58 29	3 7 2	3 15 45	3 24 38	3 33 39	3 42 49	3 52 7	4 1 52	4 11 5	4 20 47
11	2 9 59	2 17 17	2 24 46	2 32 23	2 40 10	2 48 8	2 56 15	3 4 33	3 12 58	3 21 32	3 30 15	3 39 7	3 48 6	3 57 14	4 6 28
12	2 2 46	2 9 38	2 16 45	2 23 57	2 31 21	2 38 55	2 46 40	2 54 37	3 2 33	3 10 42	3 18 58	3 27 23	3 35 56	3 44 40	3 53 29
13	1 56 16	2 2 47	2 9 30	2 16 18	2 23 18	2 30 30	2 37 53	2 45 22	2 53 0	3 0 47	3 8 44	3 16 47	3 24 59	3 33 19	3 41 55
14	1 50 19	1 56 33	2 2 54	2 9 27	2 16 8	2 22 58	2 29 57	2 37 6	2 42 22	2 51 48	2 59 22	3 7 4	3 14 59	3 22 53	3 31 0
15	1 44 33	1 50 25	1 56 27	2 2 39	2 8 59	2 15 30	2 22 10	2 28 59	2 35 54	2 43 1	2 50 13	2 57 34	3 4 56	3 12 41	3 20 24
16	1 40 12	1 45 49	1 51 38	1 57 43	2 3 49	2 10 0	2 16 21	2 22 52	2 29 31	2 36 17	2 43 11	2 50 14	2 57 25	3 4 42	3 12 7
17	1 35 39	1 41 1	1 46 34	1 52 15	1 58 3	2 3 59	2 10 5	2 16 18	2 22 39	2 29 8	2 35 45	2 42 31	2 49 24	2 56 17	3 3 26
18	1 31 35	1 36 40	1 41 56	1 47 21	1 52 54	1 58 35	2 4 22	2 10 20	2 16 25	2 22 38	2 28 59	2 35 29	2 42 4	2 48 46	2 55 37
19	1 27 56	1 32 47	1 37 51	1 43 2	1 48 51	1 54 47	1 59 36	2 5 1	2 10 51	2 16 49	2 22 55	2 29 7	2 35 25	2 41 53	2 48 30
20	1 24 24	1 29 4	1 33 54	1 38 52	1 43 57	1 49 11	1 54 31	2 0 0	2 5 35	2 11 18	2 17 8	2 23 6	2 29 12	2 35 24	2 41 43
21	1 21 11	1 25 31	1 30 9	1 34 53	1 39 47	1 44 56	1 50 3	1 55 21	2 0 45	2 6 13	2 11 50	2 17 34	2 23 26	2 29 13	2 35 28
22	1 18 9	1 22 29	1 26 56	1 31 30	1 36 11	1 41 1	1 45 58	1 51 3	1 56 15	2 1 32	2 6 54	2 12 24	2 17 59	2 23 40	2 29 31
23	1 15 25	1 19 28	1 23 43	1 28 5	1 32 34	1 37 12	1 41 58	1 46 50	1 51 48	1 56 51	2 2 10	2 7 28	2 12 51	2 18 22	2 24 1

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	9 4 0	9 18 29	9 32 59	9 47 36	10 2 11	10 16 43	10 31 20	10 45 58	11 0 36	11 15 22	11 29 52	11 44 34	11 59 13	12 13 52	12 28 36
1	8 21 30	8 35 40	8 49 53	9 4 9	9 18 23	9 32 41	9 46 58	10 1 21	10 15 43	10 30 5	10 44 31	10 58 57	11 13 23	11 27 50	11 42 19
2	7 43 19	7 57 5	8 10 55	8 24 44	8 38 40	8 52 37	9 6 36	9 20 37	9 34 40	9 48 44	10 2 50	10 16 55	10 31 6	10 45 19	10 59 33
3	7 9 0	7 22 27	7 35 49	7 49 18	8 2 47	8 16 18	8 29 51	8 43 34	8 57 13	9 10 57	9 24 40	9 38 30	9 52 20	10 6 12	10 20 3
4	6 38 31	6 51 21	7 4 16	7 17 17	7 30 20	7 43 24	7 56 34	8 9 49	8 23 3	8 36 25	8 49 47	9 3 14	9 16 42	9 30 13	9 43 46
5	6 11 6	6 23 25	6 35 51	6 48 23	7 0 58	7 13 43	7 26 19	7 39 10	7 52 1	8 4 56	8 17 51	8 30 56	8 44 0	8 57 10	9 10 22
6	5 46 38	5 58 27	6 10 22	6 22 24	6 34 29	6 46 43	6 58 56	7 11 18	7 23 43	7 36 14	7 48 46	8 1 26	8 14 4	8 26 51	8 39 40
7	5 24 32	5 35 52	5 47 17	5 58 52	6 10 30	6 22 14	6 33 59	6 46 0	6 57 55	7 10 29	7 22 3	7 34 20	7 46 36	7 58 57	8 11 22
8	5 4 42	5 15 30	5 26 11	5 37 35	5 48 46	6 0 4	6 11 23	6 22 53	6 34 24	6 46 1	6 57 43	7 9 32	7 21 24	7 33 22	7 45 23
9	4 46 48	4 57 18	5 7 40	5 18 27	5 29 1	5 39 53	5 50 45	6 1 49	6 12 53	6 24 6	6 35 23	6 46 47	6 58 13	7 9 47	7 21 24
10	4 30 35	4 40 27	4 50 29	5 0 43	5 11 2	5 21 25	5 31 54	5 42 31	5 53 13	6 4 0	6 14 51	6 25 50	6 36 54	6 48 3	6 59 10
11	4 15 52	4 25 22	4 35 0	4 44 44	4 54 36	5 4 35	5 14 38	5 24 56	5 35 7	5 45 33	5 55 42	6 6 33	6 17 12	6 27 59	6 38 50
12	4 2 27	4 11 33	4 20 46	4 30 7	4 39 33	4 49 6	4 58 46	5 8 37	5 18 30	5 28 28	5 38 33	5 48 46	5 59 13	6 9 26	6 19 55
13	3 50 31	3 59 14	4 7 57	4 16 55	4 25 54	4 35 5	4 44 23	4 53 49	5 3 19	5 12 56	5 22 42	5 32 30	5 42 23	5 52 24	6 2 29
14	3 39 9	3 47 30	3 56 0	4 4 38	4 13 17	4 22 6	4 31 3	4 40 4	4 49 7	4 58 28	5 7 49	5 17 16	5 26 49	5 36 28	5 46 9
15	3 28 15	3 35 55	3 43 57	3 52 30	4 0 51	4 9 18	4 17 51	4 26 31	4 35 17	4 44 10	4 53 8	5 2 13	5 11 23	5 20 40	5 30 2
16	3 19 40	3 27 19	3 35 3	3 42 57	3 50 57	3 59 5	4 7 21	4 15 42	4 24 8	4 32 40	4 41 18	4 50 5	4 59 1	5 8 58	5 16 57
17	3 10 42	3 18 5	3 25 35	3 33 11	3 40 54	3 48 44	3 56 40	4 4 42	4 12 48	4 21 5	4 29 29	4 37 57	4 46 30	4 55 8	5 3 51
18	3 2 35	3 9 39	3 16 50	3 24 7	3 31 32	3 39 4	3 46 45	3 54 30	4 2 19	4 10 15	4 18 18	4 26 27	4 34 41	4 43 0	4 51 25
19	2 55 12	3 2 1	3 8 55	3 15 57	3 23 5	3 30 21	3 37 43	3 45 12	3 52 48	4 0 28	4 8 13	4 16 6	4 24 1	4 32 5	4 40 15
20	2 48 9	2 54 42	3 1 21	3 8 7	3 14 59	3 21 57	3 29 3	3 36 15	3 43 32	3 50 55	3 58 25	4 6 0	4 13 41	4 21 28	4 29 22
21	2 41 40	2 47 58	2 54 21	3 0 51	3 7 28	3 14 11	3 21 0	3 27 55	3 34 55	3 42 1	3 49 12	3 56 30	4 3 58	4 11 28	4 19 4
22	2 35 30	2 41 35	2 47 46	2 54 2	3 0 25	3 6 55	3 13 30	3 20 12	3 26 57	3 33 52	3 40 50	3 47 54	3 55 8	4 2 23	4 9 48
23	2 29 46	2 35 36	2 41 34	2 47 38	2 53 48	3 0 3	3 6 25	3 12 51	3 19 24	3 25 45	3 32 29	3 39 17	3 46 21	3 53 24	4 0 34

LATITUDE 4° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 11 38	0 12 57	0 15 18	0 18 33	0 22 36	0 27 24	0 33 1	0 39 33	0 46 29	0 54 0	1 2 26	1 11 8	1 20 17	1 29 56	1 39 59
1	0 11 40	0 13 34	0 16 34	0 20 40	0 26 17	0 32 20	0 39 28	0 47 19	0 56 12	1 5 22	1 15 13	1 25 32	1 36 26	1 47 36	1 59 6
2	0 11 53	0 14 46	0 19 20	0 25 0	0 32 45	0 41 4	0 50 18	1 0 45	1 11 46	1 23 13	1 34 57	1 47 16	2 0 3	2 12 46	2 25 50
3	0 12 49	0 18 14	0 25 52	0 35 40	0 47 24	0 59 24	1 11 50	1 24 43	1 38 49	1 52 41	2 6 38	2 20 34	2 34 55	2 49 14	3 3 44
4	Not calculable.														
5	0 12 48	0 18 24	0 25 52	0 35 41	0 47 14	0 59 14	1 11 47	1 24 49	1 38 44	1 52 24	2 6 14	2 20 18	2 34 39	2 48 52	3 3 20
6	0 11 53	0 14 46	0 19 13	0 25 0	0 32 43	0 40 55	0 50 23	1 0 33	1 11 28	1 22 46	1 34 41	1 46 51	1 59 38	2 12 19	2 25 27
7	0 11 44	0 13 39	0 16 36	0 20 44	0 26 1	0 32 13	0 39 16	0 47 6	0 55 50	1 5 2	1 14 46	1 25 0	1 35 52	1 47 1	1 58 33
8	0 11 40	0 13 6	0 15 19	0 18 31	0 22 34	0 27 21	0 32 58	0 39 16	0 46 12	0 53 46	1 2 0	1 10 34	1 19 51	1 29 24	1 39 20
9	0 11 36	0 12 43	0 14 28	0 17 4	0 20 17	0 24 11	0 28 52	0 33 59	0 39 48	0 46 10	0 53 3	1 0 21	1 8 18	1 16 35	1 25 15
10	0 11 33	0 12 26	0 13 51	0 15 57	0 18 44	0 21 59	0 25 53	0 30 18	0 35 20	0 40 43	0 46 39	0 52 59	0 59 50	1 7 6	1 14 41
11	0 11 27	0 12 13	0 13 28	0 15 20	0 17 40	0 20 30	0 23 48	0 27 37	0 31 56	0 36 40	0 41 50	0 47 25	0 53 24	0 59 52	1 6 36
12	0 11 23	0 11 58	0 13 11	0 14 42	0 16 49	0 19 20	0 22 14	0 25 33	0 29 21	0 33 33	0 38 8	0 43 2	0 48 29	0 54 14	1 0 13
13	0 11 19	0 11 52	0 12 52	0 14 19	0 16 13	0 18 24	0 20 53	0 23 53	0 27 19	0 31 6	0 35 10	0 39 36	0 44 27	0 49 35	0 55 3
14	0 11 18	0 11 47	0 12 41	0 13 56	0 15 39	0 17 36	0 19 54	0 22 37	0 25 41	0 29 2	0 32 44	0 36 46	0 41 12	0 45 49	0 50 47
15	0 11 12	0 11 44	0 12 33	0 13 41	0 15 12	0 17 2	0 19 7	0 21 33	0 24 19	0 27 25	0 30 46	0 34 29	0 38 25	0 42 39	0 47 14
16	0 11 11	0 11 37	0 12 19	0 13 24	0 14 44	0 16 23	0 18 21	0 20 33	0 23 4	0 25 57	0 28 57	0 32 27	0 36 4	0 39 58	0 44 6
17	0 11 10	0 11 35	0 12 15	0 13 12	0 14 29	0 16 1	0 17 45	0 19 48	0 22 12	0 24 45	0 27 37	0 30 43	0 34 8	0 37 45	0 41 38
18	0 11 9	0 11 33	0 12 10	0 13 4	0 14 14	0 15 34	0 17 13	0 19 8	0 21 18	0 23 45	0 26 23	0 29 27	0 32 23	0 35 44	0 39 22
19	0 11 7	0 11 26	0 12 5	0 12 54	0 14 0	0 15 15	0 16 49	0 18 33	0 20 33	0 22 49	0 25 19	0 28 0	0 30 52	0 34 2	0 37 24
20	0 11 5	0 11 23	0 11 59	0 12 44	0 13 44	0 14 54	0 16 20	0 18 4	0 19 56	0 22 1	0 24 19	0 26 50	0 29 34	0 32 31	0 35 40
21	0 11 5	0 11 23	0 11 55	0 12 37	0 13 34	0 14 41	0 16 1	0 17 35	0 19 20	0 21 20	0 23 30	0 25 52	0 28 23	0 31 10	0 34 7
22	0 11 2	0 11 19	0 11 47	0 12 27	0 13 22	0 14 24	0 15 43	0 17 9	0 18 48	0 20 42	0 22 42	0 24 56	0 27 20	0 30 0	0 32 44
23	0 11 0	0 11 16	0 11 42	0 12 21	0 13 14	0 14 13	0 15 24	0 16 46	0 18 20	0 20 5	0 21 59	0 24 4	0 26 24	0 28 50	0 31 28

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 11 38	0 12 57	0 15 18	0 18 33	0 22 36	0 27 24	0 33 1	0 39 33	0 46 29	0 54 0	1 2 26	1 11 8	1 20 17	1 29 56	1 39 59
1	0 11 32	0 12 39	0 14 30	0 16 57	0 20 30	0 24 23	0 28 56	0 34 11	0 40 14	0 46 35	0 53 33	1 0 56	1 9 5	1 17 19	1 26 1
2	0 11 28	0 12 24	0 13 53	0 15 59	0 18 53	0 22 14	0 26 5	0 30 24	0 35 41	0 41 10	0 47 6	0 53 36	1 0 36	1 7 54	1 15 36
3	0 11 24	0 12 14	0 13 32	0 15 22	0 17 47	0 20 40	0 24 1	0 27 50	0 32 20	0 37 5	0 42 23	0 48 0	0 54 13	1 0 40	1 7 35
4	0 11 21	0 12 0	0 13 14	0 14 47	0 16 57	0 19 31	0 22 28	0 25 49	0 29 46	0 33 58	0 38 40	0 43 42	0 49 12	0 54 59	1 1 9
5	0 11 19	0 11 54	0 12 56	0 14 25	0 16 20	0 18 35	0 21 14	0 24 15	0 27 44	0 31 34	0 35 41	0 40 15	0 45 12	0 50 26	0 56 0
6	0 11 18	0 11 49	0 12 44	0 14 1	0 15 46	0 17 46	0 20 12	0 22 54	0 26 1	0 29 31	0 33 19	0 37 26	0 41 55	0 46 41	0 51 48
7	0 11 16	0 11 45	0 12 36	0 13 46	0 15 22	0 17 11	0 19 22	0 21 50	0 24 43	0 27 51	0 31 20	0 35 6	0 39 6	0 43 37	0 48 10
8	0 11 14	0 11 41	0 12 27	0 13 33	0 14 50	0 16 38	0 18 38	0 20 56	0 23 34	0 26 27	0 29 39	0 33 7	0 36 50	0 40 57	0 45 10
9	0 11 12	0 11 37	0 12 21	0 13 21	0 14 37	0 16 12	0 18 4	0 20 11	0 22 35	0 25 16	0 28 13	0 31 25	0 34 51	0 38 40	0 42 33
10	0 11 13	0 11 35	0 12 15	0 13 9	0 14 22	0 15 49	0 17 31	0 19 29	0 21 46	0 24 15	0 26 58	0 29 57	0 33 12	0 36 42	0 40 27
11	0 11 8	0 11 29	0 12 5	0 12 58	0 14 5	0 15 25	0 17 1	0 18 51	0 20 57	0 23 17	0 25 51	0 28 37	0 31 38	0 34 15	0 38 24
12	0 11 6	0 11 26	0 11 59	0 12 45	0 13 50	0 15 6	0 16 37	0 18 19	0 20 17	0 22 28	0 24 53	0 27 31	0 30 23	0 33 27	0 36 45
13	0 11 4	0 11 23	0 11 54	0 12 41	0 13 42	0 14 52	0 16 18	0 17 52	0 19 44	0 21 47	0 24 1	0 26 29	0 29 11	0 32 3	0 35 9
14	0 11 3	0 11 21	0 11 50	0 12 33	0 13 30	0 14 36	0 15 55	0 17 25	0 19 11	0 21 5	0 23 14	0 25 36	0 28 10	0 30 51	0 33 45
15	0 11 0	0 11 17	0 11 45	0 12 26	0 13 20	0 14 23	0 15 38	0 17 1	0 18 42	0 20 32	0 22 33	0 24 46	0 27 9	0 29 44	0 32 30
16	0 10 58	0 11 16	0 11 41	0 12 21	0 13 10	0 14 13	0 15 21	0 16 42	0 18 18	0 20 0	0 21 56	0 24 1	0 26 19	0 28 44	0 31 21
17	0 10 57	0 11 13	0 11 38	0 12 15	0 13 4	0 14 2	0 15 8	0 16 26	0 17 54	0 19 29	0 21 21	0 23 19	0 25 29	0 27 51	0 30 20
18	0 10 56	0 11 11	0 11 34	0 12 10	0 12 53	0 13 48	0 14 54	0 16 8	0 17 33	0 19 6	0 20 50	0 22 44	0 24 49	0 27 0	0 29 22
19	0 10 55	0 11 9	0 11 32	0 12 6	0 12 49	0 13 39	0 14 42	0 15 52	0 17 14	0 18 44	0 20 23	0 22 9	0 24 7	0 26 14	0 28 30
20	0 10 54	0 11 6	0 11 28	0 12 0	0 12 40	0 13 29	0 14 29	0 15 36	0 16 52	0 18 18	0 19 53	0 21 37	0 23 30	0 25 29	0 27 40
21	0 10 52	0 11 5	0 11 26	0 11 56	0 12 35	0 13 24	0 14 19	0 15 23	0 16 37	0 17 58	0 19 28	0 21 6	0 22 56	0 24 52	0 26 56
22	0 10 51	0 11 3	0 11 22	0 11 52	0 12 28	0 13 15	0 14 10	0 15 12	0 16 22	0 17 40	0 19 6	0 20 40	0 22 24	0 24 15	0 26 12
23	0 10 48	0 11 0	0 11 19	0 11 47	0 12 24	0 13 7	0 13 59	0 14 59	0 16 6	0 17 21	0 18 43	0 20 14	0 21 53	0 23 40	0 25 34

LATITUDE 4° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 50 30	2 1 12	2 12 18	2 23 27	2 35 12	2 47 0	2 59 2	3 11 12	3 23 37	3 36 12	3 48 50	4 1 41	4 14 34	4 27 42	4 40 52
1	2 10 55	2 23 2	2 35 28	2 47 57	3 0 42	3 13 40	3 26 41	3 39 39	3 53 16	4 6 49	4 20 17	4 33 51	4 47 39	5 1 32	5 15 21
2	2 39 13	2 52 46	3 6 20	3 19 58	3 33 51	3 47 52	4 1 53	4 15 54	4 30 3	4 44 26	4 58 43	5 12 56	5 27 23	5 41 50	5 56 18
3	3 18 1	3 32 42	3 47 20	4 1 54	4 16 34	4 31 17	4 46 0	5 0 42	5 15 30	5 30 17	5 45 4	5 59 53	6 14 40	6 29 31	6 44 22
4	Not calculable.														
5	3 17 47	3 32 22	3 46 56	4 1 36	4 16 14	4 30 51	4 45 42	5 0 21	5 14 58	5 29 51	5 44 39	5 59 24	6 14 4	6 28 58	6 43 49
6	2 38 42	2 52 15	3 5 45	3 19 25	3 33 16	3 47 12	4 1 9	4 15 13	4 29 19	4 43 34	4 57 47	5 12 4	5 26 25	5 40 51	5 55 13
7	2 10 15	2 22 27	2 34 41	2 47 7	2 59 51	3 12 43	3 25 44	3 38 59	3 42 9	4 5 34	4 19 4	4 32 39	4 46 18	5 0 9	5 13 56
8	1 49 39	2 0 21	2 11 16	2 22 32	2 34 4	2 45 51	2 57 47	3 9 53	3 22 8	3 34 45	3 47 17	4 0 2	4 13 51	4 25 52	4 38 57
9	1 34 19	1 43 50	1 53 34	2 3 40	2 14 2	2 24 44	2 35 29	2 46 36	2 57 55	3 9 28	3 21 4	3 32 57	3 45 0	3 57 14	4 9 30
10	1 22 41	1 31 12	1 39 54	1 48 52	1 58 13	2 7 52	2 17 43	2 26 53	2 38 15	2 48 33	2 59 40	3 10 39	3 21 44	3 33 10	3 44 39
11	1 13 45	1 21 14	1 29 4	1 37 13	1 45 40	1 54 22	2 3 24	2 12 40	2 23 9	2 31 53	2 41 50	2 52 0	3 2 22	3 12 54	3 23 40
12	1 6 39	1 13 25	1 20 28	1 27 45	1 35 28	1 43 24	1 51 39	2 0 6	2 8 50	2 17 45	2 26 56	2 36 23	2 45 58	2 55 50	3 5 49
13	1 0 50	1 6 58	1 13 23	1 20 6	1 27 3	1 34 22	1 41 50	1 49 40	1 57 42	2 6 0	2 14 26	2 23 9	2 32 6	2 41 18	2 50 34
14	0 56 5	1 1 43	1 7 35	1 13 37	1 20 1	1 26 46	1 33 41	1 40 49	1 48 16	1 55 58	2 3 49	2 11 50	2 20 10	2 28 43	2 37 25
15	0 52 6	0 57 12	1 2 37	1 8 14	1 14 11	1 20 19	1 26 45	1 33 21	1 40 14	1 47 19	1 54 39	2 2 10	2 9 50	2 12 52	2 26 2
16	0 48 35	0 53 22	0 58 21	1 3 26	1 8 59	1 14 42	1 20 40	1 26 49	1 33 13	1 39 50	1 46 36	1 53 41	2 0 56	2 8 24	2 15 59
17	0 45 45	0 50 8	0 54 46	0 59 36	1 4 41	1 10 2	1 15 30	1 21 18	1 27 14	1 33 25	1 39 47	1 46 23	1 53 6	2 0 8	2 7 16
18	0 43 14	0 47 19	0 51 35	0 56 6	1 0 51	1 5 51	1 11 0	1 16 19	1 21 17	1 27 41	1 33 40	1 39 48	1 46 10	1 52 43	1 59 27
19	0 41 0	0 44 49	0 48 49	0 53 11	0 57 29	1 2 8	1 6 57	1 11 58	1 17 14	1 22 43	1 28 16	1 34 4	1 40 6	1 46 17	1 52 36
20	0 39 1	0 42 36	0 46 22	0 50 18	0 54 27	0 58 51	1 3 23	1 8 8	1 13 1	1 18 10	1 23 25	1 28 51	1 34 34	1 40 21	1 46 23
21	0 37 16	0 40 39	0 44 11	0 47 54	0 51 47	0 55 56	1 0 12	1 4 41	1 9 17	1 14 9	1 19 7	1 24 19	1 29 39	1 35 9	1 40 48
22	0 35 42	0 38 53	0 42 14	0 45 44	0 49 26	0 53 17	0 57 20	1 1 34	1 5 56	1 10 30	1 15 12	1 20 4	1 25 9	1 30 23	1 35 44
23	0 34 17	0 37 17	0 40 27	0 43 44	0 47 15	0 50 55	0 54 44	0 58 43	1 2 52	1 7 11	1 11 40	1 16 18	1 21 5	1 25 59	1 31 8

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 50 30	2 1 12	2 12 18	2 23 27	2 35 12	2 47 0	2 59 2	3 11 12	3 23 37	3 31 12	3 48 50	4 1 41	4 14 34	4 27 42	4 40 52
1	1 35 15	1 44 51	1 54 43	2 4 51	2 15 18	2 26 1	2 36 58	2 48 11	2 59 37	3 11 14	3 22 57	3 34 54	3 47 3	3 59 22	4 11 42
2	1 23 42	1 32 16	1 41 3	1 50 11	1 59 22	2 9 24	2 19 23	2 29 36	2 40 3	2 50 50	3 1 43	3 12 45	3 24 2	3 35 36	3 47 13
3	1 14 45	1 22 25	1 30 22	1 38 36	1 47 7	1 56 0	2 5 8	2 14 29	2 24 9	2 33 58	2 44 3	2 54 22	3 2 54	3 15 36	3 26 29
4	1 7 42	1 14 33	1 21 42	1 29 14	1 37 0	1 45 5	1 53 30	2 2 5	2 10 57	2 20 1	2 29 24	2 38 57	2 48 43	2 58 46	3 8 52
5	1 1 57	1 8 12	1 14 43	1 21 35	1 28 42	1 36 6	1 43 49	1 51 45	1 59 55	2 8 23	2 16 58	2 25 50	2 34 56	2 44 17	2 53 46
6	0 57 13	1 2 58	1 8 56	1 15 11	1 21 43	1 28 35	1 35 39	1 42 58	1 50 32	1 58 23	2 6 25	2 14 39	2 23 8	2 31 51	2 40 42
7	0 53 13	0 58 29	1 4 1	1 9 50	1 15 49	1 22 13	1 28 43	1 35 28	1 42 34	1 49 56	1 57 21	2 5 1	2 12 56	2 21 1	2 29 27
8	0 49 50	0 54 44	0 59 48	1 5 9	1 10 50	1 16 40	1 22 45	1 29 7	1 35 38	1 42 26	1 49 29	1 56 43	2 4 5	2 11 37	2 19 33
9	0 46 53	0 51 28	0 56 12	1 1 10	1 6 28	1 11 54	1 17 35	1 23 33	1 29 39	1 36 1	1 42 37	1 49 25	1 56 21	2 3 25	2 10 53
10	0 44 23	0 48 37	0 53 3	0 57 44	1 2 36	1 7 42	1 13 1	1 18 34	1 24 21	1 30 19	1 36 30	1 42 53	1 49 27	1 56 13	2 3 10
11	0 42 8	0 46 4	0 50 14	0 54 38	0 59 13	1 4 0	1 9 2	1 14 15	1 19 41	1 25 18	1 31 6	1 37 7	1 43 18	1 49 41	1 56 15
12	0 40 13	0 43 56	0 47 49	0 51 56	0 56 16	1 0 49	1 5 31	1 10 26	1 15 31	1 20 47	1 26 18	1 32 0	1 37 49	1 43 47	1 50 6
13	0 38 26	0 41 59	0 45 38	0 49 31	0 53 38	0 57 51	1 2 17	1 6 56	1 11 53	1 16 45	1 21 56	1 27 18	1 32 49	1 38 33	1 44 24
14	0 36 51	0 40 10	0 43 39	0 47 17	0 51 8	0 55 13	0 59 27	1 3 51	1 8 26	1 13 20	1 18 7	1 23 14	1 28 31	1 33 58	1 39 35
15	0 35 26	0 38 35	0 41 55	0 45 23	0 49 3	0 52 54	0 56 54	1 1 4	1 5 25	1 9 55	1 14 33	1 19 26	1 24 27	1 29 39	1 34 58
16	0 34 8	0 37 8	0 40 15	0 43 35	0 47 3	0 50 40	0 54 30	0 58 30	1 2 38	1 6 58	1 11 24	1 16 1	1 20 46	1 25 45	1 30 51
17	0 32 59	0 35 51	0 38 48	0 41 58	0 45 16	0 48 45	0 52 22	0 56 11	1 0 7	1 4 13	1 8 29	1 12 53	1 17 17	1 22 1	1 26 50
18	0 31 54	0 34 36	0 37 27	0 40 27	0 43 37	0 46 57	0 50 22	0 54 0	0 57 45	1 1 41	1 5 45	1 9 56	1 14 17	1 18 47	1 23 26
19	0 30 55	0 33 31	0 36 13	0 39 4	0 42 5	0 45 16	0 48 34	0 52 2	0 55 37	0 59 21	1 3 15	1 7 17	1 11 28	1 15 46	1 20 13
20	0 29 58	0 32 26	0 35 2	0 37 48	0 40 41	0 43 45	0 46 53	0 50 12	0 53 39	0 57 16	1 0 58	1 4 50	1 8 46	1 12 55	1 17 9
21	0 29 9	0 31 31	0 33 59	0 36 37	0 39 21	0 42 18	0 45 20	0 48 30	0 51 48	0 55 16	0 58 49	1 2 31	1 6 19	1 10 16	1 14 2
22	0 28 21	0 30 36	0 33 0	0 35 30	0 38 10	0 40 58	0 43 51	0 46 51	0 50 2	0 53 20	0 56 47	1 0 19	1 4 1	1 7 44	1 11 43
23	0 27 36	0 29 47	0 32 4	0 34 28	0 37 1	0 39 42	0 42 29	0 45 25	0 48 26	0 51 37	0 54 53	0 58 19	1 1 52	1 5 30	1 9 18

LATITUDE 4° NORTH OR SOUTH.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	4 54 6	5 7 30	5 20 53	5 34 26	5 48 1	6 1 43	6 15 27	6 29 4	6 43 3	6 56 57	7 10 53	7 24 51	7 38 52	7 52 57	8 7 5
1	4 24 17	4 36 53	4 49 43	5 2 35	5 15 32	5 28 34	5 41 45	5 54 59	6 8 17	6 21 39	6 35 5	6 48 35	7 2 8	7 15 44	7 29 27
2	3 58 58	4 10 54	4 22 55	4 35 7	4 47 26	4 59 51	5 12 25	5 25 0	5 37 44	5 50 33	6 3 28	6 16 25	6 29 28	6 42 34	6 55 50
3	3 37 41	3 48 52	4 0 6	4 11 33	4 23 12	4 34 57	4 46 54	4 58 54	5 11 2	5 23 12	5 35 34	5 47 58	6 0 29	6 13 2	6 25 46
4	3 19 11	3 29 40	3 40 24	3 51 13	4 2 11	4 13 18	4 24 36	4 35 58	4 47 31	4 59 7	5 10 55	5 22 43	5 34 41	5 46 46	5 58 58
5	3 3 27	3 13 16	3 23 19	3 33 30	3 43 52	3 54 24	4 5 5	4 15 50	4 26 47	4 37 51	4 49 4	5 0 23	5 11 46	5 23 20	5 35 0
6	2 49 48	2 59 3	3 8 32	3 18 4	3 27 51	3 37 46	3 47 56	3 58 9	4 8 32	4 18 59	4 29 41	4 40 27	4 51 21	5 2 22	5 13 30
7	2 37 59	2 46 38	2 55 32	3 4 35	3 13 55	3 23 11	3 32 51	3 42 29	3 52 21	4 2 19	4 12 38	4 22 42	4 33 17	4 43 36	4 54 20
8	2 27 28	2 35 44	2 44 9	2 52 42	3 1 26	3 10 17	3 19 22	3 28 32	3 37 52	3 47 22	3 57 2	4 6 48	4 16 49	4 26 41	4 36 52
9	2 18 20	2 26 8	2 34 4	2 42 8	2 50 25	2 58 48	3 7 25	3 16 7	3 24 58	3 33 59	3 43 11	3 52 29	4 2 4	4 11 30	4 21 14
10	2 10 17	2 17 34	2 25 3	2 32 43	2 40 31	2 48 30	2 56 37	3 4 54	3 13 23	3 21 59	3 30 43	3 39 34	3 48 38	3 57 50	4 7 4
11	2 3 0	2 9 47	2 16 59	2 24 15	2 31 38	2 39 14	2 46 58	2 54 51	3 2 52	3 11 4	3 19 23	3 27 51	3 36 26	3 45 11	3 54 2
12	1 56 28	2 3 2	2 9 47	2 16 37	2 23 40	2 30 51	2 38 14	2 45 45	2 53 25	3 1 13	3 9 9	3 17 13	3 25 26	3 33 47	3 42 18
13	1 50 37	1 56 50	2 3 16	2 9 48	2 16 26	2 23 19	2 30 21	2 37 31	2 44 48	2 52 14	2 59 50	3 7 33	3 15 24	3 23 23	3 31 30
14	1 45 17	1 51 14	1 57 17	2 3 33	2 9 56	2 16 28	2 23 9	2 29 59	2 36 56	2 44 4	2 51 20	2 58 42	3 6 18	3 13 52	3 21 39
15	1 40 28	1 46 7	1 51 55	1 57 51	2 3 57	2 10 12	2 16 34	2 23 7	2 29 46	2 36 35	2 43 31	2 50 36	2 57 47	3 5 7	3 12 31
16	1 36 4	1 41 26	1 47 1	1 52 50	1 58 41	2 4 33	2 10 38	2 16 54	2 23 17	2 29 46	2 36 24	2 43 11	2 50 6	2 57 7	3 4 16
17	1 31 54	1 37 3	1 42 22	1 47 50	1 53 25	1 59 7	2 4 58	2 10 57	2 17 4	2 23 18	2 29 40	2 36 11	2 42 48	2 49 27	2 56 20
18	1 28 11	1 33 5	1 38 9	1 43 22	1 48 43	1 54 11	1 59 45	2 5 31	2 11 21	2 17 20	2 23 27	2 29 42	2 36 3	2 42 31	2 49 7
19	1 24 48	1 29 29	1 34 22	1 39 21	1 44 58	1 50 42	1 55 19	2 0 32	2 6 10	2 11 55	2 17 48	2 23 47	2 29 52	2 36 6	2 42 30
20	1 21 31	1 26 2	1 30 40	1 35 28	1 40 23	1 45 26	1 50 33	1 55 50	2 1 14	2 6 46	2 12 25	2 18 10	2 24 4	2 30 3	2 36 10
21	1 18 33	1 22 47	1 27 16	1 31 51	1 36 34	1 41 29	1 46 26	1 51 33	1 56 46	2 2 3	2 7 29	2 13 1	2 18 41	2 24 17	2 30 20
22	1 15 44	1 19 55	1 24 13	1 28 38	1 33 10	1 37 50	1 42 37	1 47 31	1 52 32	1 57 39	2 2 51	2 8 11	2 13 36	2 19 8	2 24 48
23	1 13 10	1 17 7	1 21 14	1 25 28	1 29 49	1 34 18	1 38 54	1 43 37	1 48 26	1 53 20	1 58 26	2 3 34	2 8 49	2 14 10	2 19 38

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	8 21 12	8 35 22	8 49 36	9 3 50	9 18 2	9 32 31	9 46 40	10 1 1	10 15 22	10 29 45	10 44 8	10 58 37	11 13 0	11 27 29	11 41 56
1	7 43 10	7 56 56	8 10 46	8 24 35	8 38 30	8 52 26	9 6 25	9 20 28	9 34 29	9 48 32	10 2 38	10 16 46	10 30 55	10 45 6	10 59 18
2	7 9 5	7 22 21	7 35 43	7 49 12	8 2 41	8 16 11	8 29 45	8 43 27	8 57 5	9 10 48	9 24 33	9 38 23	9 52 12	10 6 5	10 19 57
3	6 38 31	6 51 21	7 4 16	7 17 17	7 30 20	7 43 24	7 56 34	8 9 49	8 23 3	8 36 25	8 49 47	9 3 14	9 16 42	9 30 13	9 43 46
4	6 11 12	6 23 33	6 35 57	6 48 31	7 1 4	7 13 42	7 26 27	7 39 16	7 52 6	8 5 4	8 17 58	8 31 4	8 44 10	8 57 19	9 10 30
5	5 46 45	5 58 35	6 10 31	6 22 33	6 34 39	6 46 50	6 59 6	7 11 28	7 23 54	7 36 24	7 48 57	8 1 37	8 14 17	8 27 1	8 39 52
6	5 24 44	5 36 4	5 47 33	5 59 5	6 10 45	6 22 28	6 34 17	6 46 15	6 58 4	7 10 16	7 22 23	7 34 39	7 46 55	7 59 16	8 11 42
7	5 5 0	5 15 52	5 26 48	5 37 55	5 49 5	6 0 24	6 11 43	6 23 18	6 34 46	6 46 56	6 58 6	7 9 58	7 21 48	7 33 45	7 45 46
8	4 47 10	4 57 30	5 8 3	5 18 41	5 29 25	5 40 18	5 51 11	6 2 16	6 13 21	6 24 34	6 35 51	6 47 17	6 58 45	7 10 18	7 21 54
9	4 31 4	4 40 57	4 51 2	5 1 14	5 11 32	5 21 59	5 32 26	5 43 6	5 53 45	6 4 34	6 15 27	6 26 28	6 37 31	6 48 31	6 59 54
10	4 16 24	4 25 54	4 35 34	4 45 21	4 55 12	5 5 11	5 15 16	5 25 29	5 35 46	5 46 12	5 56 41	6 7 17	6 17 57	6 28 44	6 39 33
11	4 3 3	4 12 9	4 21 24	4 30 46	4 40 11	4 49 49	4 59 31	5 9 19	5 19 13	5 29 15	5 39 21	5 49 34	5 59 52	6 10 15	6 20 46
12	3 50 53	3 59 37	4 8 28	4 17 27	4 26 32	4 35 49	4 45 4	4 54 29	5 4 1	5 13 38	5 23 23	5 33 15	5 43 11	5 53 12	6 3 21
13	3 39 45	3 48 8	3 56 37	4 5 16	4 13 57	4 22 46	4 31 44	4 40 50	4 50 0	4 59 17	5 8 45	5 18 11	5 27 43	5 37 24	5 47 10
14	3 29 31	3 37 34	3 45 44	3 53 59	4 2 22	4 10 52	4 19 30	4 28 11	4 37 2	4 45 58	4 55 0	5 4 8	5 13 22	5 22 43	5 32 2
15	3 20 10	3 26 53	3 34 55	3 43 38	3 51 42	3 59 52	4 8 10	4 16 33	4 25 3	4 33 40	4 42 22	4 51 11	5 0 5	5 9 6	5 18 12
16	3 11 33	3 18 56	3 26 23	3 34 0	3 41 44	3 49 35	3 57 34	4 5 38	4 13 47	4 22 2	4 30 23	4 38 53	4 47 33	4 57 14	5 4 56
17	3 3 20	3 10 27	3 17 41	3 25 0	3 32 26	3 40 0	3 47 41	3 55 27	4 3 19	4 11 18	4 19 24	4 27 37	4 35 56	4 44 19	4 52 46
18	2 55 51	3 2 41	3 9 38	3 16 40	3 23 50	3 31 7	3 38 33	3 46 3	3 53 37	4 1 18	4 9 6	4 17 0	4 25 0	4 33 4	4 41 13
19	2 48 59	2 55 34	3 2 13	3 9 1	3 15 55	3 22 56	3 30 3	3 37 19	3 44 41	3 52 7	3 59 38	4 7 17	4 14 58	4 22 47	4 30 42
20	2 42 23	2 48 43	2 54 9	3 1 43	3 8 23	3 15 8	3 22 0	3 28 58	3 36 1	3 43 11	3 50 27	3 57 48	4 5 16	4 12 49	4 20 29
21	2 36 20	2 42 26	2 48 37	2 54 55	3 1 20	3 7 51	3 14 28	3 21 11	3 27 59	3 34 52	3 51 50	3 48 55	3 56 11	4 3 28	4 10 51
22	2 30 35	2 36 28	2 42 27	2 48 32	2 54 44	3 1 2	3 7 26	3 13 55	3 20 28	3 27 8	3 33 56	3 40 50	3 47 50	3 54 55	4 2 5
23	2 25 12	2 30 52	2 36 39	2 42 32	2 48 31	2 54 36	3 0 46	3 7 1	3 13 23	3 19 42	3 26 15	3 32 52	3 39 40	3 46 31	3 53 29

LATITUDE 5° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 11 33	0 12 40	0 14 28	0 17 4	0 20 21	0 24 21	0 29 3	0 34 14	0 40 3	0 46 31	0 53 27	1 0 51	1 8 56	1 17 13	1 25 55
1	0 11 38	0 12 57	0 15 21	0 18 30	0 22 42	0 27 33	0 32 59	0 39 24	0 46 34	0 54 3	1 2 20	1 11 2	1 20 17	1 29 49	1 39 50
2	0 11 44	0 13 39	0 16 37	0 20 43	0 26 17	0 32 24	0 39 31	0 47 21	0 56 10	1 5 19	1 15 3	1 25 27	1 36 21	1 47 30	1 58 58
3	0 11 53	0 14 46	0 19 13	0 25 1	0 32 45	0 40 59	0 50 34	1 0 43	1 11 42	1 22 55	1 34 48	1 47 3	1 59 47	2 12 34	2 25 41
4	0 12 48	0 18 24	0 25 52	0 35 41	0 47 14	0 59 14	1 11 47	1 24 49	1 38 44	1 52 24	2 6 14	2 20 18	2 34 39	2 48 52	3 3 20
5	Not calculable.														
6	0 12 47	0 18 14	0 25 53	0 35 35	0 47 4	0 59 1	1 11 34	1 24 44	1 38 24	1 52 2	2 6 1	2 19 59	2 34 22	2 48 39	3 3 5
7	0 12 9	0 14 57	0 19 13	0 25 5	0 32 39	0 40 52	0 50 19	1 0 22	1 11 22	1 22 40	1 34 31	1 46 45	1 59 27	2 12 10	2 25 9
8	0 11 50	0 13 42	0 16 38	0 20 50	0 26 2	0 32 5	0 39 11	0 47 5	0 56 35	1 5 41	1 14 35	1 24 53	1 35 30	1 46 40	1 58 7
9	0 11 40	0 13 6	0 15 19	0 18 31	0 22 31	0 27 19	0 32 54	0 39 10	0 46 0	0 53 39	1 2 7	1 10 21	1 19 29	1 29 6	1 39 0
10	0 11 37	0 12 39	0 14 28	0 16 54	0 20 16	0 24 2	0 28 41	0 33 46	0 39 43	0 45 58	0 52 47	1 0 11	1 8 1	1 16 21	1 24 54
11	0 11 23	0 12 22	0 13 52	0 16 2	0 18 44	0 22 2	0 25 50	0 30 13	0 35 7	0 40 32	0 46 28	0 52 51	0 59 38	1 6 52	1 14 26
12	0 11 26	0 12 13	0 13 29	0 15 15	0 17 37	0 20 26	0 23 43	0 27 31	0 31 46	0 36 34	0 41 55	0 47 16	0 53 15	0 59 37	1 6 23
13	0 11 23	0 11 58	0 13 10	0 14 41	0 16 48	0 19 18	0 22 13	0 25 29	0 29 15	0 33 37	0 37 56	0 42 53	0 48 15	0 53 58	0 59 58
14	0 11 19	0 11 52	0 12 52	0 14 15	0 16 11	0 18 19	0 20 51	0 23 48	0 27 17	0 30 54	0 34 59	0 39 29	0 44 17	0 49 24	0 54 48
15	0 11 14	0 11 49	0 12 42	0 13 57	0 15 36	0 17 35	0 19 52	0 22 35	0 25 35	0 28 57	0 32 29	0 36 38	0 40 57	0 45 37	0 50 33
16	0 11 14	0 11 41	0 12 31	0 13 37	0 15 9	0 16 54	0 19 3	0 21 27	0 24 14	0 27 19	0 30 36	0 34 17	0 38 18	0 42 29	0 47 0
17	0 11 12	0 11 37	0 12 22	0 13 24	0 14 45	0 16 24	0 18 19	0 20 33	0 23 7	0 25 51	0 28 56	0 32 18	0 35 55	0 39 51	0 44 0
18	0 11 10	0 11 36	0 12 15	0 13 12	0 14 27	0 15 56	0 17 42	0 19 45	0 22 6	0 24 39	0 27 31	0 30 35	0 33 59	0 37 34	0 41 26
19	0 11 9	0 11 31	0 12 8	0 13 2	0 14 12	0 15 33	0 17 14	0 19 5	0 21 15	0 23 37	0 26 16	0 29 9	0 32 16	0 35 37	0 39 11
20	0 11 8	0 11 29	0 12 3	0 12 50	0 13 54	0 15 13	0 16 43	0 18 30	0 20 32	0 22 43	0 25 12	0 27 51	0 30 47	0 33 52	0 37 15
21	0 11 7	0 11 27	0 12 0	0 12 43	0 13 43	0 14 56	0 16 24	0 18 1	0 19 52	0 21 57	0 24 15	0 26 45	0 29 29	0 32 24	0 35 32
22	0 11 4	0 11 22	0 11 50	0 12 33	0 13 30	0 14 37	0 16 0	0 17 30	0 19 18	0 21 14	0 23 23	0 25 41	0 28 16	0 31 2	0 33 55
23	0 11 2	0 11 19	0 11 46	0 12 27	0 13 22	0 14 25	0 15 38	0 17 7	0 18 44	0 20 35	0 22 36	0 24 47	0 27 14	0 29 47	0 32 33

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 11 33	0 12 40	0 14 28	0 17 4	0 20 21	0 24 21	0 29 3	0 34 14	0 40 3	0 46 31	0 53 27	1 0 51	1 8 56	1 17 13	1 25 55
1	0 11 28	0 12 24	0 13 53	0 15 59	0 18 53	0 22 14	0 26 2	0 30 33	0 35 40	0 41 4	0 47 4	0 53 34	1 0 33	1 7 48	1 15 32
2	0 11 24	0 12 7	0 13 32	0 15 22	0 17 47	0 20 40	0 23 59	0 27 50	0 32 20	0 37 3	0 42 22	0 47 59	0 54 10	1 0 39	1 7 32
3	0 11 21	0 12 0	0 13 14	0 14 47	0 16 57	0 19 30	0 22 29	0 25 49	0 29 45	0 33 57	0 38 39	0 43 41	0 49 9	0 54 57	1 1 8
4	0 11 19	0 11 54	0 12 56	0 14 25	0 16 20	0 18 35	0 21 14	0 24 15	0 27 44	0 31 34	0 35 41	0 40 15	0 45 12	0 50 26	0 56 0
5	0 11 17	0 11 50	0 12 45	0 14 1	0 15 46	0 17 44	0 20 12	0 22 54	0 26 1	0 29 31	0 33 19	0 37 25	0 41 55	0 46 42	0 51 48
6	0 11 16	0 11 45	0 12 37	0 13 45	0 15 22	0 17 11	0 19 22	0 21 50	0 24 43	0 27 51	0 31 21	0 35 7	0 39 14	0 43 36	0 48 18
7	0 11 14	0 11 43	0 12 28	0 13 34	0 15 0	0 16 39	0 18 40	0 20 58	0 23 36	0 26 29	0 29 40	0 33 8	0 36 48	0 40 59	0 45 11
8	0 11 12	0 11 39	0 12 21	0 13 21	0 14 38	0 16 12	0 18 3	0 20 11	0 22 34	0 25 14	0 28 13	0 31 27	0 34 53	0 38 42	0 42 36
9	0 11 11	0 11 35	0 12 14	0 13 11	0 14 22	0 15 48	0 17 33	0 19 31	0 21 42	0 24 16	0 27 0	0 29 58	0 33 10	0 36 44	0 40 23
10	0 11 9	0 11 32	0 12 9	0 12 58	0 14 8	0 15 29	0 17 5	0 18 53	0 21 3	0 23 22	0 25 54	0 28 41	0 31 45	0 35 2	0 38 31
11	0 11 7	0 11 26	0 12 0	0 12 50	0 13 52	0 15 8	0 16 38	0 18 21	0 20 19	0 22 30	0 24 56	0 27 31	0 30 23	0 33 27	0 36 44
12	0 11 5	0 11 23	0 11 53	0 12 39	0 13 39	0 14 49	0 16 16	0 17 51	0 19 43	0 21 46	0 24 3	0 26 31	0 29 13	0 32 5	0 35 11
13	0 11 3	0 11 21	0 11 49	0 12 33	0 13 30	0 14 37	0 15 58	0 17 27	0 19 13	0 21 10	0 23 17	0 25 36	0 28 10	0 30 53	0 33 48
14	0 11 2	0 11 19	0 11 45	0 12 26	0 13 21	0 14 23	0 15 37	0 17 5	0 18 45	0 20 33	0 22 34	0 24 47	0 27 14	0 29 47	0 32 33
15	0 10 59	0 11 15	0 11 41	0 12 19	0 13 11	0 14 11	0 15 22	0 16 42	0 18 18	0 20 2	0 21 57	0 24 3	0 26 19	0 28 46	0 31 24
16	0 10 57	0 11 13	0 11 37	0 12 15	0 13 3	0 14 3	0 15 8	0 16 25	0 17 56	0 19 34	0 21 23	0 23 23	0 25 34	0 27 53	0 30 23
17	0 10 56	0 11 11	0 11 34	0 12 10	0 12 56	0 13 51	0 14 54	0 16 9	0 17 34	0 19 3	0 20 52	0 22 45	0 24 49	0 27 4	0 29 26
18	0 10 55	0 11 9	0 11 31	0 12 5	0 12 47	0 13 39	0 14 41	0 15 53	0 17 15	0 18 43	0 20 23	0 22 12	0 24 12	0 26 17	0 28 33
19	0 10 54	0 11 7	0 11 29	0 12 1	0 12 42	0 13 31	0 14 31	0 15 38	0 16 56	0 18 22	0 19 57	0 21 40	0 23 33	0 25 36	0 27 45
20	0 10 52	0 11 4	0 11 25	0 11 56	0 12 34	0 13 22	0 14 19	0 15 24	0 16 38	0 18 0	0 19 31	0 21 11	0 23 0	0 24 55	0 27 0
21	0 10 51	0 11 3	0 11 23	0 11 52	0 12 29	0 13 16	0 14 10	0 15 11	0 16 22	0 17 41	0 19 8	0 20 42	0 22 27	0 24 19	0 26 19
22	0 10 50	0 11 1	0 11 20	0 11 48	0 12 23	0 13 8	0 14 1	0 15 0	0 16 9	0 17 23	0 18 47	0 20 18	0 21 58	0 23 45	0 25 38
23	0 10 47	0 10 58	0 11 17	0 11 44	0 12 19	0 13 0	0 13 50	0 14 48	0 15 53	0 17 5	0 18 25	0 19 53	0 21 29	0 23 12	0 25 2

LATITUDE 5° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 36 6	1 44 42	1 54 34	2 4 41	2 15 1	2 25 49	2 36 48	2 47 58	2 59 26	3 11 3	3 22 45	3 34 43	3 46 51	3 59 8	4 11 29
1	1 50 19	2 1 2	2 11 59	2 23 22	2 34 54	2 46 45	2 58 47	3 10 59	3 23 22	3 35 52	3 48 35	4 1 24	4 14 19	4 27 23	4 40 34
2	2 10 48	2 22 50	2 35 13	2 47 44	3 0 31	3 13 27	3 26 31	3 39 43	3 53 2	4 6 31	4 19 57	4 33 39	4 47 22	5 1 9	5 14 58
3	2 38 53	2 52 27	3 6 3	3 19 42	3 33 35	3 47 32	4 1 35	4 15 38	4 29 48	4 44 0	4 58 21	5 12 26	5 26 52	5 41 27	5 55 51
4	3 17 47	3 32 22	3 46 56	4 1 36	4 16 14	4 30 51	4 45 42	5 0 21	5 14 58	5 29 51	5 44 39	5 59 24	6 14 4	6 28 58	6 43 49
5	Not calculable.														
6	3 17 25	3 32 34	3 46 40	4 1 11	4 15 46	4 30 30	4 45 3	4 59 48	5 14 28	5 29 16	5 43 58	5 58 45	6 13 32	6 28 24	6 43 10
7	2 38 17	2 51 50	3 5 19	3 18 56	3 32 46	3 46 42	4 0 36	4 14 39	4 28 48	4 43 3	4 57 6	5 11 27	5 25 48	5 40 10	5 54 32
8	2 9 49	2 21 54	2 34 8	2 46 37	2 59 17	3 12 7	3 25 9	3 38 12	3 51 27	4 4 49	4 18 20	4 31 50	4 45 31	4 59 13	5 13 4
9	1 49 19	2 0 5	2 10 54	2 22 11	2 33 37	2 45 20	2 57 10	3 9 16	3 21 33	3 34 5	3 46 35	3 59 18	4 12 9	4 25 7	4 38 8
10	1 33 57	1 43 24	1 53 9	2 3 11	2 13 33	2 24 11	2 34 58	2 45 58	2 57 17	3 8 53	3 20 24	3 32 10	3 44 14	3 56 23	4 8 42
11	1 22 26	1 30 46	1 39 29	1 48 29	1 57 50	2 7 21	2 17 15	2 27 21	2 37 40	2 48 12	2 58 59	3 9 55	3 20 57	3 32 22	3 43 50
12	1 13 27	1 20 55	1 28 43	1 36 49	1 45 15	1 54 1	2 2 56	2 12 1	2 21 32	2 31 16	2 41 13	2 51 19	3 1 39	3 12 8	3 22 49
13	1 6 20	1 13 0	1 20 3	1 27 28	1 35 1	1 42 56	1 51 8	1 59 37	2 8 15	2 17 10	2 26 20	2 35 43	2 45 16	2 55 5	3 5 0
14	1 0 35	1 6 43	1 12 59	1 19 42	1 26 40	1 33 56	1 41 24	1 49 8	1 57 8	2 5 26	2 13 48	2 22 30	2 31 23	2 40 31	2 49 45
15	0 56 49	1 1 21	1 7 13	1 13 17	1 19 42	1 26 18	1 33 13	1 40 20	1 47 43	1 55 20	2 3 11	2 11 15	2 19 41	2 27 59	2 36 38
16	0 51 50	0 56 57	1 2 18	1 7 56	1 13 45	1 19 51	1 26 17	1 32 51	1 39 40	1 46 48	1 54 3	2 1 31	2 9 12	2 17 8	2 25 13
17	0 48 26	0 53 12	0 58 6	1 3 17	1 8 43	1 14 22	1 20 15	1 26 24	1 32 44	1 39 20	1 46 7	1 53 6	2 0 17	2 7 43	2 15 15
18	0 45 32	0 49 52	0 54 30	0 59 15	1 4 20	1 9 38	1 15 5	1 20 46	1 26 52	1 32 50	1 39 14	1 45 42	1 52 29	1 59 24	2 6 32
19	0 42 18	0 47 3	0 51 19	0 55 49	1 0 30	1 5 29	1 10 34	1 15 52	1 21 25	1 27 13	1 33 6	1 39 14	1 45 33	1 52 3	1 58 45
20	0 40 46	0 44 35	0 48 33	0 52 45	0 57 8	1 1 46	1 6 33	1 11 33	1 16 43	1 22 11	1 27 42	1 33 29	1 39 25	1 45 35	1 51 51
21	0 38 50	0 42 26	0 46 8	0 50 4	0 54 10	0 58 33	1 3 1	1 7 45	1 12 35	1 17 41	1 22 54	1 28 22	1 33 56	1 39 42	1 45 42
22	0 37 4	0 40 23	0 43 54	0 47 37	0 51 29	0 55 35	0 59 48	1 4 16	1 8 51	1 13 37	1 18 35	1 23 41	1 29 0	1 34 27	1 40 4
23	0 35 30	0 38 38	0 41 57	0 45 26	0 49 6	0 52 58	0 56 57	1 1 8	1 5 29	1 10 0	1 14 39	1 19 32	1 24 31	1 29 41	1 35 4

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 36 6	1 44 42	1 54 34	2 4 41	2 15 1	2 25 49	2 36 48	2 47 58	2 59 26	3 11 3	3 22 45	3 34 43	3 46 51	3 59 8	4 11 29
1	1 23 39	1 32 4	1 40 56	1 50 1	1 59 33	2 9 16	2 19 16	2 29 29	2 39 58	2 50 42	3 1 36	3 12 39	3 23 55	3 35 24	3 47 2
2	1 14 42	1 22 22	1 30 18	1 38 34	1 47 4	1 55 45	2 5 6	2 14 26	2 24 1	2 33 55	2 43 59	2 54 18	3 4 48	3 15 30	3 26 23
3	1 7 41	1 14 31	1 21 41	1 29 12	1 36 57	1 45 2	1 53 27	2 2 2	2 10 56	2 19 58	2 29 22	2 38 52	2 48 39	2 58 30	3 8 48
4	1 1 57	1 8 12	1 14 43	1 21 35	1 28 42	1 36 6	1 43 49	1 51 45	1 59 55	2 8 23	2 16 58	2 25 50	2 34 56	2 44 17	2 53 46
5	0 57 13	1 2 55	1 8 57	1 15 12	1 21 43	1 28 36	1 35 40	1 42 59	1 50 34	1 58 25	2 6 26	2 14 40	2 23 9	2 31 52	2 40 35
6	0 53 13	0 58 43	1 4 3	1 9 50	1 15 52	1 22 13	1 28 45	1 35 33	1 42 36	1 49 54	1 57 24	2 5 6	2 13 0	2 21 13	2 29 33
7	0 49 52	0 54 44	0 59 52	1 5 17	1 10 52	1 16 48	1 22 49	1 29 6	1 35 46	1 42 36	1 49 30	1 56 44	2 4 12	2 11 53	2 19 40
8	0 46 56	0 51 30	0 56 13	1 1 11	1 6 28	1 11 56	1 17 38	1 23 36	1 29 43	1 36 4	1 42 40	1 49 29	1 56 25	2 3 29	2 10 57
9	0 44 28	0 48 43	0 53 7	0 57 45	1 2 42	1 7 49	1 13 9	1 18 40	1 24 19	1 30 21	1 36 38	1 43 4	1 49 37	1 56 17	2 3 21
10	0 42 19	0 46 12	0 50 22	0 54 46	0 59 22	1 4 11	1 9 12	1 14 24	1 19 48	1 25 23	1 31 11	1 37 15	1 43 30	1 49 54	1 56 28
11	0 40 13	0 43 56	0 47 52	0 52 0	0 56 20	1 0 50	1 5 36	1 10 32	1 15 40	1 20 58	1 26 28	1 32 10	1 38 2	1 44 5	1 50 18
12	0 38 28	0 42 0	0 45 41	0 49 35	0 53 41	0 58 0	1 2 26	1 7 5	1 11 54	1 16 58	1 22 11	1 27 34	1 33 8	1 38 51	1 44 46
13	0 36 53	0 40 14	0 43 43	0 47 25	0 51 18	0 55 21	0 59 34	1 4 0	1 8 35	1 13 21	1 18 18	1 23 25	1 28 41	1 34 10	1 39 45
14	0 35 30	0 38 39	0 41 57	0 45 27	0 49 7	0 53 0	0 57 0	1 1 12	1 5 33	1 10 17	1 14 46	1 19 38	1 24 40	1 29 52	1 35 13
15	0 34 11	0 37 11	0 40 21	0 43 38	0 47 9	0 50 50	0 54 39	0 58 37	1 2 46	1 7 8	1 11 33	1 16 13	1 21 0	1 25 59	1 31 4
16	0 33 3	0 35 55	0 38 53	0 42 4	0 45 23	0 48 50	0 52 30	0 56 19	1 0 16	1 4 25	1 8 39	1 13 4	1 17 37	1 22 23	1 27 15
17	0 31 58	0 34 42	0 37 32	0 40 33	0 43 43	0 47 3	0 50 31	0 54 10	0 57 56	1 1 52	1 5 58	1 10 11	1 14 32	1 19 5	1 23 42
18	0 30 59	0 33 34	0 36 19	0 39 10	0 42 13	0 45 25	0 48 42	0 52 12	0 55 47	0 59 34	1 3 29	1 7 30	1 11 41	1 16 1	1 20 29
19	0 30 4	0 32 33	0 35 10	0 37 55	0 40 48	0 43 52	0 47 2	0 50 22	0 53 49	0 57 27	1 1 9	1 5 2	1 9 3	1 13 11	1 17 28
20	0 29 13	0 31 35	0 34 5	0 36 43	0 39 29	0 42 26	0 45 27	0 48 39	0 51 57	0 55 27	0 59 0	1 2 44	1 6 34	1 10 35	1 14 38
21	0 28 26	0 30 43	0 33 6	0 35 38	0 38 16	0 41 6	0 44 1	0 47 5	0 50 15	0 53 35	0 57 1	1 0 36	1 4 17	1 8 5	1 12 3
22	0 27 41	0 29 52	0 32 11	0 34 36	0 37 10	0 39 52	0 42 39	0 45 35	0 48 39	0 51 50	0 55 10	0 58 34	1 2 8	1 5 48	1 9 36
23	0 27 0	0 29 5	0 31 18	0 33 37	0 36 5	0 38 41	0 41 22	0 44 12	0 47 8	0 50 12	0 53 22	0 56 41	1 0 6	1 3 38	1 7 18

LATITUDE 5° NORTH OR SOUTH.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	4 22 58	4 36 40	4 49 25	5 2 17	5 15 15	5 28 17	5 41 28	5 54 41	6 7 58	6 22 12	6 34 45	6 48 13	7 1 46	7 15 22	7 29 2
1	3 58 48	4 10 44	4 22 46	4 34 58	4 47 15	4 59 41	5 12 12	5 24 47	5 37 30	5 49 16	6 3 13	6 16 9	6 29 11	6 42 18	6 55 31
2	3 37 25	3 48 37	4 0 0	4 11 27	4 23 3	4 34 49	4 46 46	4 58 45	5 10 53	5 23 1	5 35 25	5 47 49	6 0 19	6 12 52	6 25 36
3	3 19 7	3 29 35	3 40 18	3 51 7	4 2 4	4 13 13	4 24 29	4 35 51	4 47 24	4 59 1	5 10 49	5 22 38	5 34 36	5 46 40	5 58 51
4	3 3 27	3 13 16	3 23 19	3 33 30	3 43 52	3 54 24	4 5 5	4 15 50	4 26 47	4 37 51	4 49 4	5 0 23	5 11 46	5 23 20	5 35 0
5	2 49 50	2 59 6	3 8 32	3 18 8	3 27 53	3 37 49	3 47 58	3 58 12	4 8 34	4 19 2	4 29 43	4 40 30	4 51 23	5 2 25	5 13 33
6	2 38 1	2 46 44	2 55 39	3 4 42	3 13 53	3 23 16	3 32 51	3 42 35	3 52 26	4 2 26	4 12 33	4 22 48	4 33 13	4 43 44	4 54 25
7	2 27 42	2 35 51	2 44 16	2 52 49	3 1 39	3 10 25	3 19 35	3 28 43	3 38 5	3 47 33	3 57 23	4 6 58	4 17 5	4 26 55	4 37 11
8	2 18 26	2 26 15	2 34 12	2 42 16	2 50 38	2 58 56	3 7 33	3 16 15	3 25 8	3 34 11	3 43 23	3 52 41	4 2 17	4 11 43	4 21 27
9	2 10 23	2 17 44	2 25 16	2 32 54	2 40 50	2 48 42	2 56 54	3 5 10	3 13 37	3 22 14	3 31 0	3 39 51	3 49 1	3 58 1	4 7 19
10	2 3 13	2 10 8	2 17 13	2 24 29	2 31 55	2 39 31	2 47 16	2 55 10	3 3 13	3 11 25	3 19 45	3 28 14	3 36 50	3 45 34	3 54 28
11	1 56 42	2 3 16	2 10 0	2 16 55	2 23 58	2 31 11	2 38 32	2 46 4	2 53 44	3 1 34	3 9 31	3 17 37	3 25 51	3 34 12	3 42 41
12	1 50 50	1 57 5	2 3 31	2 10 4	2 16 48	2 23 38	2 30 39	2 37 51	2 45 10	2 52 38	3 0 15	3 7 59	3 15 52	3 23 51	3 32 0
13	1 45 29	1 51 25	1 57 33	2 3 51	2 10 14	2 16 47	2 23 31	2 30 21	2 37 21	2 44 28	2 51 45	2 59 8	3 6 40	3 14 20	3 22 8
14	1 40 43	1 46 24	1 52 14	1 58 10	2 4 17	2 10 33	2 16 58	2 23 28	2 30 10	2 36 59	2 43 58	2 51 2	2 58 16	3 5 36	3 13 6
15	1 36 19	1 41 42	1 47 17	1 52 57	1 58 49	2 4 46	2 10 54	2 17 10	2 23 34	2 30 5	2 36 44	2 43 35	2 50 29	2 57 31	3 4 43
16	1 32 15	1 37 24	1 42 46	1 48 18	1 53 54	1 59 30	2 5 20	2 11 22	2 17 30	2 23 44	2 30 7	2 36 39	2 43 19	2 50 5	2 56 59
17	1 28 29	1 33 26	1 38 32	1 43 47	1 49 9	1 54 37	2 0 14	2 6 0	2 11 53	2 17 53	2 24 1	2 30 18	2 36 40	2 43 9	2 49 47
18	1 25 4	1 29 47	1 34 40	1 39 42	1 44 51	1 50 6	1 55 31	2 1 2	2 6 39	2 12 25	2 18 19	2 24 20	2 30 27	2 36 42	2 43 5
19	1 21 59	1 26 25	1 31 7	1 35 54	1 40 50	1 45 53	1 50 55	1 56 22	2 1 48	2 7 21	2 13 1	2 18 47	2 24 40	2 30 41	2 36 52
20	1 18 52	1 23 14	1 27 43	1 32 20	1 37 4	1 41 57	1 46 53	1 51 58	1 57 12	2 2 34	2 8 2	2 13 35	2 19 17	2 25 5	2 31 0
21	1 16 6	1 20 18	1 24 38	1 29 4	1 33 37	1 38 17	1 43 5	1 48 1	1 53 3	1 58 10	2 3 25	2 8 46	2 14 14	2 19 49	2 25 31
22	1 13 29	1 17 31	1 21 41	1 25 57	1 30 21	1 34 51	1 39 28	1 44 12	1 49 2	1 53 59	1 59 3	2 4 13	2 9 29	2 14 51	2 20 21
23	1 11 3	1 14 55	1 18 55	1 23 2	1 27 16	1 31 36	1 36 3	1 40 37	1 45 17	1 50 3	1 54 55	1 59 54	2 5 0	2 10 12	2 15 30

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	7 42 44	7 56 30	8 10 19	8 24 8	8 38 1	8 51 56	9 5 55	9 19 54	9 33 56	9 48 0	10 2 7	10 16 14	10 30 23	10 44 33	10 58 46
1	7 8 45	7 22 1	7 35 25	7 48 12	8 2 20	8 15 49	8 29 25	8 43 2	8 56 45	9 10 27	9 24 12	9 37 59	9 51 50	10 5 42	10 19 36
2	6 38 20	6 51 11	7 4 6	7 17 3	7 30 4	7 43 12	7 56 22	8 9 38	8 22 51	8 36 12	8 49 35	9 3 0	9 16 28	9 29 58	9 43 33
3	6 11 6	6 23 25	6 35 51	6 48 23	7 0 58	7 13 43	7 26 19	7 39 10	7 52 1	8 4 56	8 17 51	8 30 56	8 44 0	8 57 10	9 10 22
4	5 46 45	5 58 35	6 10 31	6 22 33	6 34 39	6 46 50	6 59 6	7 11 28	7 23 54	7 36 24	7 48 57	8 1 37	8 14 17	8 27 1	8 39 52
5	5 24 47	5 36 8	5 47 36	5 59 9	6 10 48	6 22 32	6 34 20	6 46 18	6 58 17	7 10 20	7 22 27	7 34 42	7 47 0	7 59 21	8 11 46
6	5 5 8	5 15 58	5 26 57	5 38 4	5 49 15	6 0 33	6 11 53	6 23 24	6 34 56	6 46 36	6 58 19	7 10 7	7 22 1	7 33 59	7 46 1
7	4 47 23	4 57 49	5 8 19	5 18 58	5 29 40	5 40 33	5 51 26	6 2 36	6 13 38	6 25 24	6 36 9	6 47 37	6 59 3	7 10 37	7 22 14
8	4 31 17	4 41 11	4 51 18	5 1 31	5 11 49	5 22 17	5 32 44	5 43 24	5 54 4	6 4 54	6 15 47	6 26 49	6 37 52	6 49 4	7 0 19
9	4 16 42	4 26 12	4 35 54	4 45 42	4 55 35	5 5 37	5 15 38	5 25 56	5 36 13	5 46 38	5 57 8	6 7 47	6 18 26	6 29 15	6 40 6
10	4 3 29	4 12 35	4 21 50	4 31 13	4 40 43	4 50 19	5 0 1	5 9 50	5 19 45	5 29 47	5 39 55	5 50 15	6 0 40	6 11 1	6 21 22
11	3 51 19	4 0 4	4 8 56	4 17 56	4 27 2	4 36 16	4 45 36	4 55 3	5 4 36	5 14 14	5 24 1	5 33 51	5 43 49	5 53 52	6 4 0
12	3 40 17	3 48 40	3 57 9	4 5 47	4 14 31	4 23 22	4 32 21	4 41 26	4 50 38	4 59 55	5 9 19	5 18 50	5 28 25	5 38 7	5 47 55
13	3 30 4	3 38 8	3 46 18	3 54 37	4 2 59	4 11 30	4 20 8	4 28 54	4 37 45	4 46 42	4 55 48	5 4 58	5 14 11	5 24 33	5 33 0
14	3 20 40	3 28 24	3 36 15	3 44 12	3 52 17	4 0 29	4 8 45	4 17 9	4 25 40	4 34 21	4 42 59	4 51 50	5 0 49	5 9 54	5 18 51
15	3 12 2	3 19 26	3 26 59	3 34 35	3 42 23	3 50 17	3 58 18	4 6 20	4 14 33	4 22 54	4 31 13	4 39 47	4 48 27	4 57 13	5 5 54
16	3 4 1	3 11 9	3 18 2	3 25 44	3 33 11	3 40 46	3 48 29	3 56 17	4 4 10	4 12 9	4 20 14	4 28 28	4 36 53	4 45 19	4 53 45
17	2 56 33	3 3 35	3 10 23	3 17 26	3 24 36	3 31 55	3 39 22	3 46 53	3 54 30	4 2 13	4 10 2	4 18 1	4 26 6	4 34 14	4 42 26
18	2 49 36	2 56 12	3 2 55	3 9 43	3 16 38	3 23 41	3 30 52	3 38 7	3 45 28	3 52 55	4 0 29	4 8 9	4 15 55	4 23 44	4 31 37
19	2 43 8	2 49 30	2 55 56	3 2 31	3 9 11	3 15 58	3 22 50	3 29 53	3 37 1	3 44 14	3 51 31	3 58 57	4 6 25	4 14 0	4 21 40
20	2 37 2	2 43 9	2 49 23	2 55 44	3 2 12	3 8 45	3 15 23	3 22 7	3 28 58	3 35 55	3 42 59	3 50 8	3 57 23	4 4 44	4 12 10
21	2 31 20	2 37 15	2 43 15	2 49 22	2 55 36	3 1 56	3 8 22	3 14 54	3 21 31	3 28 12	3 34 58	3 41 52	3 48 55	3 56 2	4 3 13
22	2 25 58	2 31 41	2 37 29	2 43 23	2 49 23	2 55 30	3 1 43	3 8 2	3 14 25	3 20 55	3 27 31	3 34 11	3 40 55	3 47 47	3 54 46
23	2 20 54	2 26 24	2 32 1	2 37 44	2 43 33	2 49 27	2 55 26	3 1 31	3 7 43	3 14 0	3 20 23	3 26 50	3 33 22	3 40 1	3 46 47

LATITUDE 6° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 11 28	0 12 24	0 13 51	0 15 59	0 18 37	0 22 12	0 26 1	0 30 33	0 35 39	0 41 3	0 47 2	0 53 31	1 0 27	1 7 43	1 15 27
1	0 11 32	0 12 40	0 14 28	0 17 4	0 20 23	0 24 21	0 28 57	0 34 9	0 40 8	0 46 29	0 53 24	1 0 47	1 8 47	1 17 7	1 25 53
2	0 11 40	0 13 6	0 15 18	0 18 31	0 22 42	0 27 30	0 33 3	0 39 21	0 46 29	0 54 2	1 2 10	1 10 51	1 20 6	1 29 43	1 39 43
3	0 11 44	0 13 39	0 16 35	0 20 43	0 26 0	0 32 21	0 39 24	0 47 17	0 56 0	1 5 12	1 14 53	1 25 19	1 36 5	1 47 17	1 58 46
4	0 11 53	0 14 46	0 19 13	0 25 0	0 32 43	0 40 55	0 50 23	1 0 33	1 11 28	1 22 46	1 34 41	1 46 51	1 59 38	2 12 19	2 25 27
5	0 12 47	0 18 14	0 25 53	0 35 35	0 47 4	0 59 1	1 11 34	1 24 44	1 38 24	1 52 2	2 6 1	2 19 59	2 34 22	2 48 39	3 3 5
6	Not calculable.														
7	0 13 8	0 18 14	0 25 59	0 35 34	0 46 54	0 58 58	1 11 33	1 24 38	1 38 8	1 51 52	2 5 47	2 17 55	2 34 5	2 48 22	3 2 39
8	0 12 9	0 14 57	0 19 13	0 25 7	0 32 25	0 40 48	0 50 10	1 0 19	1 11 2	1 22 17	1 34 13	1 46 25	1 58 56	2 11 41	2 24 39
9	0 11 46	0 13 42	0 16 34	0 20 42	0 25 58	0 32 10	0 39 8	0 46 58	0 55 24	1 4 35	1 14 20	1 24 38	1 35 17	1 46 22	1 57 47
10	0 11 42	0 12 57	0 15 18	0 18 26	0 22 27	0 27 12	0 32 43	0 38 52	0 45 55	0 53 25	1 1 37	1 10 5	1 19 18	1 28 51	1 38 39
11	0 11 28	0 12 38	0 14 24	0 16 57	0 20 10	0 24 6	0 28 33	0 33 44	0 39 29	0 45 48	0 51 38	1 0 1	1 7 46	1 15 59	1 24 37
12	0 11 30	0 12 22	0 13 49	0 15 54	0 18 42	0 21 54	0 25 42	0 30 1	0 34 57	0 40 29	0 46 17	0 52 38	0 59 25	1 6 36	1 14 9
13	0 11 26	0 12 13	0 13 27	0 15 16	0 17 38	0 20 24	0 23 39	0 27 27	0 31 43	0 36 26	0 41 31	0 47 1	0 53 4	0 59 24	1 6 5
14	0 11 21	0 11 58	0 13 10	0 14 39	0 16 47	0 19 14	0 22 7	0 25 23	0 29 11	0 33 17	0 37 48	0 42 42	0 48 2	0 53 41	0 59 42
15	0 11 16	0 11 55	0 12 55	0 14 18	0 16 6	0 18 18	0 20 51	0 23 51	0 27 9	0 30 50	0 34 51	0 39 18	0 43 20	0 49 7	0 54 33
16	0 11 16	0 11 47	0 12 41	0 14 15	0 15 36	0 17 29	0 19 43	0 22 23	0 25 24	0 28 45	0 32 29	0 36 28	0 40 49	0 45 23	0 50 20
17	0 11 13	0 11 42	0 12 31	0 13 38	0 15 9	0 16 53	0 18 57	0 21 25	0 24 8	0 27 12	0 30 32	0 34 8	0 38 5	0 42 20	0 46 47
18	0 11 11	0 11 39	0 12 22	0 13 23	0 14 45	0 16 21	0 18 16	0 20 30	0 22 59	0 25 45	0 28 50	0 32 7	0 35 48	0 39 38	0 43 46
19	0 11 10	0 11 34	0 12 14	0 13 12	0 14 26	0 15 53	0 17 42	0 19 41	0 22 1	0 24 33	0 27 23	0 30 29	0 33 51	0 37 25	0 41 13
20	0 11 8	0 11 29	0 12 9	0 12 58	0 14 7	0 15 32	0 17 8	0 19 0	0 21 11	0 23 32	0 26 12	0 29 1	0 32 8	0 35 26	0 39 1
21	0 11 8	0 11 26	0 12 4	0 12 50	0 13 54	0 15 12	0 16 47	0 18 29	0 20 28	0 22 39	0 25 6	0 27 45	0 30 40	0 33 46	0 37 5
22	0 11 5	0 11 23	0 11 55	0 12 40	0 13 40	0 14 51	0 16 18	0 17 54	0 19 48	0 21 50	0 24 8	0 26 34	0 29 18	0 32 12	0 35 16
23	0 11 3	0 11 21	0 11 50	0 12 33	0 13 31	0 14 39	0 15 54	0 17 28	0 19 12	0 21 8	0 23 16	0 25 37	0 28 9	0 30 51	0 33 47

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 11 28	0 12 24	0 13 51	0 15 59	0 18 37	0 22 12	0 26 1	0 30 33	0 35 39	0 41 3	0 47 2	0 53 31	1 0 27	1 7 43	1 15 27
1	0 11 24	0 12 14	0 13 31	0 15 22	0 17 44	0 20 39	0 23 59	0 27 50	0 32 18	0 37 2	0 41 18	0 47 56	0 54 5	1 0 35	1 7 27
2	0 11 21	0 12 0	0 13 13	0 14 47	0 16 55	0 19 30	0 22 27	0 25 48	0 29 44	0 33 56	0 38 37	0 43 39	0 49 6	0 54 54	1 1 5
3	0 11 19	0 11 54	0 12 53	0 14 25	0 16 19	0 18 35	0 21 13	0 24 15	0 27 43	0 31 33	0 35 41	0 40 15	0 45 12	0 50 26	0 56 0
4	0 11 18	0 11 49	0 12 44	0 14 1	0 15 46	0 17 46	0 20 12	0 22 54	0 26 1	0 29 31	0 33 19	0 37 26	0 41 55	0 46 41	0 51 48
5	0 11 16	0 11 45	0 12 37	0 13 45	0 15 22	0 17 11	0 19 22	0 21 50	0 24 43	0 27 51	0 31 21	0 35 7	0 39 14	0 43 36	0 48 18
6	0 11 14	0 11 43	0 12 27	0 13 32	0 14 56	0 16 37	0 18 38	0 20 55	0 23 35	0 26 28	0 29 41	0 33 9	0 36 56	0 40 59	0 45 18
7	0 11 12	0 11 37	0 12 21	0 13 20	0 14 37	0 16 13	0 18 4	0 20 11	0 22 36	0 25 17	0 28 20	0 31 37	0 34 55	0 38 43	0 42 36
8	0 11 11	0 11 35	0 12 14	0 13 10	0 14 22	0 15 50	0 17 33	0 19 32	0 21 46	0 24 14	0 27 0	0 30 1	0 33 12	0 36 45	0 40 24
9	0 11 8	0 11 32	0 12 8	0 12 58	0 14 8	0 15 29	0 17 6	0 18 55	0 20 58	0 23 22	0 25 55	0 28 43	0 31 42	0 35 2	0 38 26
10	0 11 5	0 11 29	0 12 3	0 12 51	0 13 56	0 15 12	0 16 42	0 18 22	0 20 24	0 22 35	0 24 58	0 27 35	0 30 28	0 33 33	0 36 50
11	0 11 3	0 11 24	0 11 55	0 12 41	0 13 41	0 14 53	0 16 16	0 17 55	0 19 46	0 21 51	0 24 5	0 26 34	0 29 16	0 32 8	0 35 13
12	0 11 2	0 11 20	0 11 49	0 12 32	0 13 29	0 14 35	0 15 57	0 17 27	0 19 12	0 21 8	0 23 18	0 25 38	0 28 12	0 30 56	0 33 53
13	0 11 1	0 11 18	0 11 45	0 12 27	0 13 22	0 14 23	0 15 40	0 17 5	0 18 45	0 20 37	0 22 37	0 24 48	0 27 14	0 29 48	0 32 35
14	0 11 0	0 11 17	0 11 41	0 12 20	0 13 12	0 14 12	0 15 21	0 16 47	0 18 23	0 20 5	0 21 59	0 24 5	0 26 25	0 28 50	0 31 28
15	0 10 57	0 11 13	0 11 38	0 12 14	0 13 3	0 14 0	0 15 8	0 16 25	0 17 56	0 19 35	0 21 24	0 23 24	0 25 34	0 27 54	0 30 24
16	0 10 55	0 11 11	0 11 34	0 12 10	0 12 56	0 13 53	0 14 56	0 16 9	0 17 36	0 19 10	0 20 53	0 22 48	0 24 53	0 27 6	0 29 30
17	0 10 54	0 11 9	0 11 31	0 12 5	0 12 49	0 13 42	0 14 42	0 15 53	0 17 16	0 18 42	0 20 25	0 22 13	0 24 12	0 26 22	0 28 37
18	0 10 52	0 11 7	0 11 28	0 12 1	0 12 41	0 13 31	0 14 29	0 15 39	0 16 58	0 18 22	0 19 58	0 21 43	0 23 37	0 25 38	0 27 49
19	0 10 52	0 11 5	0 11 26	0 11 56	0 12 36	0 13 24	0 14 21	0 15 25	0 16 39	0 18 2	0 19 33	0 21 13	0 23 2	0 25 0	0 27 4
20	0 10 51	0 11 2	0 11 22	0 11 52	0 12 29	0 13 16	0 14 10	0 15 13	0 16 24	0 17 43	0 19 11	0 20 47	0 22 32	0 24 22	0 26 23
21	0 10 50	0 11 1	0 11 20	0 11 48	0 12 24	0 13 9	0 14 1	0 15 0	0 16 8	0 17 25	0 18 49	0 20 20	0 22 0	0 23 48	0 25 45
22	0 10 49	0 10 59	0 11 17	0 11 44	0 12 19	0 13 2	0 13 53	0 14 49	0 15 56	0 17 8	0 18 29	0 19 57	0 21 34	0 23 18	0 25 7
23	0 10 46	0 10 56	0 11 14	0 11 40	0 12 14	0 12 54	0 13 42	0 14 39	0 15 41	0 16 51	0 18 8	0 19 33	0 21 6	0 22 46	0 24 32

LATITUDE 6° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
0°	1 23 25	1 31 59	1 40 51	1 49 57	1 59 26	2 9 7	2 18 56	2 29 20	2 39 49	2 50 35	3 1 26	3 12 28	3 23 42	3 34 15	3 46 48
1	1 35 2	1 44 33	1 54 23	2 4 33	2 14 59	2 25 41	2 36 39	2 47 47	2 59 9	3 10 50	3 22 35	3 34 30	3 46 34	3 58 54	4 11 12
2	1 50 10	2 0 52	2 11 54	2 23 11	2 34 44	2 46 31	2 58 35	3 10 43	3 23 3	3 35 40	3 48 16	4 1 1	4 13 57	4 27 4	4 40 9
3	2 10 38	2 22 41	2 34 56	2 47 32	3 0 13	3 13 15	3 26 13	3 39 25	3 52 42	4 6 9	4 19 37	4 33 15	4 46 54	5 0 45	5 14 30
4	2 38 42	2 52 15	3 5 45	3 19 25	3 33 16	3 47 12	4 1 9	4 15 13	4 29 19	4 43 34	4 57 47	5 12 4	5 26 25	5 40 51	5 55 13
5	3 17 25	3 32 34	3 46 40	4 1 11	4 15 46	4 30 30	4 45 3	4 59 48	5 14 28	5 29 16	5 43 58	5 58 45	6 13 32	6 28 24	6 43 10
6	Not calculable.														
7	3 17 2	3 31 34	3 46 4	4 0 38	4 15 17	4 30 3	4 44 34	4 59 10	5 13 44	5 28 40	5 43 17	5 57 58	6 12 47	6 27 33	6 42 19
8	2 37 53	2 51 17	3 4 47	3 18 28	3 32 13	3 46 8	4 0 0	4 13 57	4 28 7	4 42 13	4 56 25	5 10 39	5 24 57	5 39 18	5 53 37
9	2 9 25	2 21 33	2 33 44	2 45 7	2 58 49	3 11 35	3 24 32	3 37 40	3 50 52	4 4 55	4 17 35	4 31 4	4 44 47	4 58 25	5 11 59
10	1 48 54	1 59 31	2 10 26	2 21 38	2 33 2	2 44 47	2 56 37	3 8 38	3 20 53	3 33 17	3 45 50	3 58 26	4 11 17	4 24 14	4 37 14
11	1 33 37	1 42 59	1 52 44	2 2 44	2 13 2	2 23 33	2 34 23	2 45 23	2 56 38	3 8 2	3 19 41	3 31 28	3 43 27	3 55 29	4 7 46
12	1 21 59	1 30 25	1 39 0	1 48 2	1 57 19	2 6 55	2 14 10	2 26 41	2 36 50	2 47 35	2 58 16	3 9 9	3 20 13	3 31 31	3 42 56
13	1 13 8	1 20 34	1 28 24	1 36 25	1 44 45	1 53 21	2 2 24	2 11 30	2 20 50	2 30 36	2 40 31	2 50 34	3 0 47	3 11 18	3 21 57
14	1 6 2	1 12 41	1 19 41	1 26 57	1 34 36	1 42 30	1 50 36	1 59 0	2 7 39	2 16 30	2 25 37	2 34 57	2 44 29	2 54 13	3 4 7
15	1 0 17	1 6 20	1 12 42	1 19 19	1 26 15	1 33 25	1 40 55	1 48 25	1 56 33	2 4 44	2 13 9	2 21 47	2 30 37	2 39 40	2 48 55
16	0 55 34	1 1 5	1 6 55	1 12 54	1 19 16	1 25 54	1 32 43	1 39 48	1 47 9	1 54 46	2 2 31	2 10 32	2 18 41	2 27 8	2 35 46
17	0 51 36	0 56 42	1 1 57	1 7 34	1 13 23	1 19 27	1 25 49	1 32 21	1 39 9	1 46 11	1 53 24	2 0 50	2 8 21	2 16 19	2 24 24
18	0 48 10	0 52 51	0 57 48	1 2 52	1 8 19	1 13 58	1 19 49	1 25 52	1 32 22	1 38 44	1 45 31	1 52 26	1 59 36	2 6 54	2 14 27
19	0 45 16	0 49 36	0 54 10	0 58 57	1 3 58	1 9 16	1 14 41	1 20 20	1 26 12	1 32 21	1 38 38	1 45 7	1 51 49	1 58 44	2 5 48
20	0 42 45	0 46 50	0 51 2	0 55 30	1 0 10	1 5 5	1 10 9	1 15 29	1 20 57	1 26 44	1 32 32	1 38 40	1 44 59	1 51 29	1 58 7
21	0 40 35	0 44 23	0 48 19	0 52 29	0 56 49	1 1 28	1 6 10	1 11 11	1 16 17	1 21 39	1 27 10	1 32 54	1 38 46	1 44 50	1 51 8
22	0 38 35	0 42 5	0 45 47	0 49 42	0 53 48	0 58 9	1 2 34	1 7 16	1 12 7	1 17 9	1 22 20	1 27 43	1 33 19	1 38 57	1 44 51
23	0 36 53	0 40 9	0 43 38	0 47 18	0 51 9	0 55 14	0 59 25	1 3 49	1 8 23	1 13 7	1 17 59	1 23 6	1 28 20	1 33 45	1 39 23

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
0°	1 23 25	1 31 59	1 40 51	1 49 57	1 59 26	2 9 7	2 18 56	2 29 20	2 39 49	2 50 35	3 1 26	3 12 28	3 23 42	3 34 15	3 46 48
1	1 14 39	1 22 18	1 30 14	1 38 29	1 47 0	1 55 51	2 4 59	2 14 19	2 23 53	2 33 48	2 43 53	2 54 0	3 4 39	3 15 23	3 26 12
2	1 7 39	1 14 28	1 21 38	1 29 8	1 36 54	1 44 57	1 53 25	2 1 57	2 10 48	2 19 55	2 29 15	2 38 46	2 48 32	2 58 33	3 8 40
3	1 1 56	1 8 11	1 14 42	1 21 34	1 28 40	1 36 9	1 43 47	1 51 43	1 59 51	2 8 20	2 16 55	2 25 48	2 34 53	2 44 13	2 53 40
4	0 57 13	1 2 58	1 8 56	1 15 11	1 21 43	1 28 35	1 35 39	1 42 58	1 50 32	1 58 23	2 6 25	2 14 39	2 23 8	2 31 51	2 40 42
5	0 53 13	0 58 43	1 4 3	1 9 50	1 15 52	1 22 13	1 28 45	1 35 33	1 42 36	1 49 54	1 57 24	2 5 6	2 13 0	2 21 13	2 29 33
6	0 49 52	0 54 47	0 59 51	1 5 13	1 10 52	1 16 43	1 22 48	1 29 10	1 35 44	1 42 35	1 49 36	1 56 48	2 4 13	2 11 51	2 19 40
7	0 46 57	0 51 29	0 56 16	1 1 20	1 6 34	1 12 6	1 17 42	1 23 34	1 29 46	1 36 14	1 42 44	1 49 31	1 56 31	2 3 45	2 11 4
8	0 44 29	0 48 45	0 53 9	0 57 48	1 2 45	1 7 52	1 13 12	1 18 48	1 24 33	1 30 31	1 36 43	1 43 9	1 49 41	1 56 21	2 3 25
9	0 42 16	0 46 17	0 50 25	0 54 46	0 59 25	1 4 14	1 9 15	1 14 30	1 19 53	1 25 31	1 31 23	1 37 27	1 43 36	1 49 54	1 56 35
10	0 40 19	0 44 3	0 48 0	0 52 7	0 56 27	1 1 5	1 5 30	1 10 47	1 15 49	1 21 6	1 26 37	1 32 22	1 38 17	1 44 22	1 50 37
11	0 38 32	0 42 2	0 45 45	0 49 39	0 53 46	0 58 2	1 2 31	1 7 11	1 12 3	1 17 5	1 22 18	1 27 43	1 33 18	1 39 1	1 44 58
12	0 37 0	0 40 21	0 43 50	0 47 29	0 51 22	0 55 27	0 59 38	1 4 3	1 8 38	1 13 30	1 18 27	1 23 33	1 28 51	1 34 20	1 39 59
13	0 35 32	0 38 43	0 42 1	0 45 32	0 49 14	0 53 5	0 57 6	1 1 17	1 5 40	1 10 13	1 14 57	1 19 50	1 24 51	1 30 5	1 35 27
14	0 34 17	0 37 17	0 40 26	0 43 48	0 47 18	0 51 3	0 54 50	0 58 51	1 2 57	1 7 26	1 11 46	1 16 25	1 21 13	1 26 11	1 31 18
15	0 33 3	0 35 55	0 38 56	0 42 4	0 45 25	0 48 56	0 52 36	0 56 25	1 0 21	1 4 36	1 8 48	1 13 15	1 17 49	1 22 35	1 27 28
16	0 32 3	0 34 48	0 37 37	0 40 40	0 43 51	0 47 10	0 50 41	0 54 21	0 58 9	1 2 7	1 6 9	1 10 22	1 14 43	1 19 16	1 23 55
17	0 31 2	0 33 39	0 36 23	0 39 16	0 42 17	0 45 30	0 48 50	0 52 21	0 55 57	0 59 44	1 3 40	1 7 43	1 11 53	1 16 13	1 20 39
18	0 30 9	0 32 38	0 35 16	0 38 0	0 40 55	0 44 0	0 47 10	0 50 31	0 53 58	0 57 36	1 1 23	1 5 15	1 9 16	1 13 27	1 17 46
19	0 29 17	0 31 40	0 34 12	0 36 50	0 39 36	0 42 34	0 45 37	0 48 49	0 52 9	0 55 39	0 59 13	1 2 57	1 6 48	1 10 46	1 14 55
20	0 28 31	0 30 48	0 33 12	0 35 43	0 38 22	0 41 12	0 44 7	0 47 12	0 50 23	0 53 46	0 57 11	1 0 46	1 4 31	1 8 23	1 12 19
21	0 27 46	0 29 58	0 32 16	0 34 43	0 37 16	0 39 59	0 42 47	0 45 45	0 48 49	0 52 2	0 55 21	0 58 48	1 2 23	1 6 2	1 9 53
22	0 27 4	0 29 11	0 31 25	0 33 45	0 36 13	0 38 50	0 41 32	0 44 24	0 47 22	0 50 26	0 53 39	0 56 56	1 0 23	1 4 0	1 7 37
23	0 26 26	0 28 26	0 30 35	0 32 50	0 35 13	0 37 44	0 40 19	0 43 3	0 45 55	0 48 53	0 51 56	0 55 9	0 58 27	1 1 53	1 5 25

LATITUDE 6° NORTH OR SOUTH.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	3 58 35	4 10 30	4 22 31	4 34 40	4 46 56	4 59 19	5 11 48	5 24 26	5 37 6	5 49 54	6 2 50	6 15 54	6 28 46	6 41 53	6 55 4
1	3 37 14	3 48 24	3 59 46	4 11 13	4 22 49	4 34 34	4 46 29	4 58 28	5 10 35	5 22 44	5 35 5	5 47 30	5 59 59	6 12 35	6 25 15
2	3 18 48	3 29 27	3 40 7	3 50 55	4 1 54	4 12 59	4 24 17	4 35 40	4 47 12	4 58 51	5 10 36	5 22 25	5 34 22	5 46 26	5 58 40
3	3 3 21	3 13 11	3 23 14	3 33 26	3 43 47	3 54 19	4 4 59	4 15 44	4 26 41	4 37 44	4 48 59	5 0 16	5 11 40	5 23 12	5 34 52
4	2 49 48	2 59 3	3 8 32	3 18 4	3 27 51	3 37 46	3 47 56	3 58 9	4 8 32	4 18 59	4 29 41	4 40 27	4 51 21	5 2 22	5 13 30
5	2 38 1	2 46 44	2 55 39	3 4 42	3 13 53	3 23 16	3 32 51	3 42 35	3 52 26	4 2 26	4 12 33	4 22 48	4 33 13	4 43 44	4 54 25
6	2 27 40	2 35 52	2 44 18	2 52 51	3 1 35	3 10 29	3 19 33	3 28 44	3 38 5	3 47 36	3 57 15	4 7 1	4 16 54	4 26 56	4 37 8
7	2 18 40	2 26 22	2 34 19	2 42 24	2 50 46	2 59 3	3 7 44	3 16 23	3 25 19	3 34 20	3 43 44	3 52 52	4 2 30	4 11 51	4 21 41
8	2 10 29	2 17 52	2 25 23	2 33 0	2 40 52	2 48 50	2 57 1	3 5 17	3 13 44	3 22 11	3 31 7	3 39 59	3 49 9	3 58 9	4 7 29
9	2 3 17	2 10 18	2 17 25	2 24 38	2 32 7	2 39 41	2 47 29	2 55 22	3 3 29	3 11 36	3 20 3	3 28 26	3 37 13	3 45 49	3 55 3
10	1 57 2	2 3 38	2 10 23	2 17 18	2 24 23	2 31 38	2 39 2	2 46 36	2 54 1	3 1 35	3 9 41	3 17 55	3 26 5	3 34 32	3 43 4
11	1 51 2	1 57 17	2 3 42	2 10 16	2 17 0	2 23 54	2 30 55	2 38 5	2 45 26	2 52 56	3 0 31	3 8 17	3 16 9	3 24 11	3 32 19
12	1 45 46	1 51 43	1 57 49	2 4 7	2 10 32	2 17 3	2 23 45	2 30 38	2 37 38	2 44 46	2 52 5	2 59 29	3 7 3	3 14 41	3 22 31
13	1 40 57	1 46 36	1 52 27	1 58 27	2 4 34	2 10 49	2 17 15	2 23 47	2 30 30	2 37 19	2 44 19	2 51 25	2 58 39	3 6 1	3 13 30
14	1 36 33	1 41 58	1 47 33	1 53 16	1 59 6	2 5 6	2 11 15	2 17 32	2 23 57	2 30 29	2 37 10	2 43 59	2 50 55	2 58 0	3 5 11
15	1 32 31	1 37 41	1 43 1	1 48 29	1 54 5	1 59 50	2 5 42	2 11 44	2 17 53	2 24 10	2 30 33	2 37 6	2 43 46	2 50 34	2 57 28
16	1 28 43	1 33 39	1 38 48	1 44 6	1 49 29	1 54 51	2 0 28	2 6 16	2 12 10	2 18 11	2 24 20	2 30 37	2 37 1	2 43 32	2 50 12
17	1 25 22	1 30 6	1 35 0	1 40 2	1 45 12	1 50 27	1 55 52	2 1 25	2 7 5	2 12 52	2 18 47	2 24 50	2 30 58	2 37 16	2 43 40
18	1 22 11	1 26 43	1 31 24	1 36 14	1 41 11	1 46 15	1 51 30	1 56 49	2 2 15	2 7 48	2 13 29	2 19 18	2 25 13	2 31 16	2 37 26
19	1 19 17	1 23 34	1 28 4	1 32 43	1 37 29	1 42 22	1 47 15	1 52 33	1 57 48	2 3 9	2 8 35	2 14 7	2 19 49	2 25 38	2 31 36
20	1 16 26	1 20 38	1 23 58	1 28 25	1 33 59	1 38 41	1 43 28	1 48 24	1 53 27	1 58 38	2 3 55	2 9 18	2 14 49	2 20 26	2 26 9
21	1 13 49	1 17 59	1 22 10	1 26 27	1 30 50	1 35 17	1 39 55	1 44 42	1 49 34	1 54 32	1 59 37	2 4 47	2 10 4	2 15 29	2 21 0
22	1 11 23	1 15 17	1 19 19	1 23 27	1 27 42	1 32 3	1 36 31	1 41 7	1 45 48	1 50 35	1 55 30	2 0 30	2 5 37	2 10 50	2 16 9
23	1 9 3	1 12 50	1 16 43	1 20 43	1 24 50	1 29 3	1 33 22	1 37 47	1 42 19	1 46 56	1 51 36	1 56 26	2 1 23	2 6 27	2 11 36

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	7 8 18	7 21 36	7 34 56	7 48 24	8 1 50	8 15 21	8 28 53	8 42 35	8 56 13	9 9 54	9 23 38	9 37 27	9 51 14	10 5 4	10 17 55
1	6 37 59	6 50 50	7 3 44	7 16 35	7 29 43	7 42 49	7 55 58	8 9 13	8 22 28	8 35 46	8 49 7	9 2 35	9 15 58	9 29 29	9 43 1
2	6 10 27	6 23 10	6 35 35	6 48 6	7 0 40	7 13 18	7 26 0	7 38 49	7 51 40	8 4 35	8 17 32	8 30 36	8 43 39	8 56 47	9 10 0
3	5 46 38	5 58 27	6 10 22	6 22 24	6 34 29	6 46 43	6 58 56	7 11 18	7 23 43	7 36 14	7 48 46	8 1 26	8 14 4	8 26 51	8 39 40
4	5 24 44	5 36 4	5 47 33	5 59 5	6 10 45	6 22 28	6 34 17	6 46 15	6 58 4	7 10 16	7 22 23	7 34 39	7 46 55	7 59 16	8 11 42
5	5 5 8	5 15 58	5 26 57	5 38 4	5 49 15	6 0 33	6 11 53	6 23 24	6 34 56	6 46 36	6 58 19	7 10 7	7 22 1	7 33 59	7 46 1
6	4 47 26	4 57 51	5 8 22	5 18 58	5 29 43	5 40 34	5 51 30	6 2 34	6 13 41	6 24 52	6 36 12	6 47 37	6 59 6	7 10 42	7 22 21
7	4 31 27	4 41 27	4 51 30	5 1 43	5 11 58	5 22 27	5 32 55	5 43 41	5 54 18	6 5 31	6 15 57	6 27 3	6 38 7	6 49 19	7 0 33
8	4 16 17	4 26 23	4 36 5	4 45 53	4 55 46	5 5 51	5 15 54	5 26 10	5 36 26	5 46 54	5 57 25	6 8 5	6 18 45	6 29 35	6 40 27
9	4 3 45	4 13 9	4 22 8	4 31 31	4 40 59	4 50 41	5 0 21	5 10 14	5 20 6	5 30 10	5 40 16	5 50 33	6 0 50	6 11 17	6 21 45
10	3 51 42	4 0 27	4 9 20	4 18 20	4 27 27	4 36 42	4 46 3	4 55 31	5 5 4	5 14 44	5 24 30	5 34 22	5 44 19	5 54 26	6 4 32
11	3 40 37	3 49 0	3 57 32	4 6 10	4 14 57	4 23 49	4 32 49	4 41 54	4 51 6	5 0 25	5 9 51	5 19 20	5 32 57	5 38 40	5 48 29
12	3 30 28	3 38 31	3 46 43	3 55 2	4 3 26	4 11 57	4 20 35	4 29 22	4 38 15	4 47 13	4 56 17	5 5 28	5 14 43	5 24 7	5 33 34
13	3 21 7	3 28 52	3 36 43	3 44 43	3 52 47	4 1 1	4 9 20	4 17 46	4 26 19	4 34 57	4 43 42	4 52 36	5 1 32	5 10 35	5 19 44
14	3 12 31	3 19 57	3 27 31	3 35 11	3 42 59	3 50 52	3 58 53	4 7 0	4 15 14	4 23 35	4 31 58	4 40 34	4 49 13	4 57 58	5 6 47
15	3 4 30	3 11 39	3 18 56	3 26 19	3 33 48	3 41 26	3 49 9	3 56 59	4 4 55	4 13 57	4 21 6	4 29 21	4 37 42	4 46 9	4 54 42
16	2 57 1	3 3 54	3 11 3	3 18 9	3 25 21	3 32 40	3 40 7	3 47 40	3 55 18	4 3 2	4 10 51	4 18 49	4 26 57	4 35 7	4 43 18
17	2 50 11	2 56 49	3 3 33	3 10 22	3 17 18	3 24 21	3 31 34	3 38 51	3 46 14	3 53 43	4 1 18	4 9 0	4 16 49	4 24 42	4 32 39
18	2 43 44	2 50 7	2 56 36	3 3 11	3 9 53	3 16 42	3 23 38	3 30 39	3 37 46	3 45 0	3 52 22	3 59 48	4 7 20	4 14 56	4 22 36
19	2 37 39	2 43 49	2 50 3	2 56 26	3 2 54	3 9 29	3 16 9	3 22 58	3 29 51	3 36 51	3 43 55	3 51 7	3 58 20	4 5 42	4 13 8
20	2 32 0	2 37 56	2 43 58	2 50 7	2 56 23	3 2 44	3 9 10	3 15 42	3 22 21	3 29 6	3 35 57	3 42 55	3 49 58	3 57 7	4 4 21
21	2 26 39	2 32 23	2 38 12	2 44 9	2 50 12	2 56 23	3 2 38	3 8 57	3 15 23	3 21 54	3 28 30	3 35 12	3 42 2	3 48 57	3 55 56
22	2 21 37	2 27 9	2 32 47	2 38 31	2 44 21	2 50 17	2 56 19	3 2 27	3 8 39	3 14 59	3 21 22	3 27 54	3 34 27	3 41 6	3 47 56
23	2 16 51	2 22 11	2 27 38	2 33 11	2 38 51	2 44 34	2 50 24	2 56 20	3 2 22	3 8 36	3 14 48	3 21 5	3 27 23	3 33 51	3 40 25

LATITUDE 7° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 11 24	0 12 7	0 13 32	0 15 22	0 17 46	0 20 39	0 23 58	0 27 47	0 32 15	0 36 59	0 42 16	0 47 53	0 54 0	1 0 39	1 7 22
1	0 11 28	0 12 34	0 13 53	0 15 59	0 18 51	0 22 10	0 25 59	0 30 30	0 35 28	0 40 51	0 46 55	0 53 21	1 0 19	1 7 38	1 15 20
2	0 11 32	0 12 39	0 14 30	0 16 57	0 20 25	0 24 19	0 28 50	0 34 0	0 39 57	0 46 10	0 53 18	1 0 41	1 8 40	1 16 52	1 25 41
3	0 11 40	0 13 6	0 15 22	0 18 31	0 22 42	0 27 26	0 32 58	0 39 16	0 46 21	0 53 54	1 2 7	1 10 44	1 19 57	1 29 33	1 39 34
4	0 11 44	0 13 39	0 16 36	0 20 44	0 26 1	0 32 13	0 39 16	0 47 6	0 55 50	1 5 2	1 14 46	1 25 0	1 35 52	1 47 1	1 58 33
5	0 12 9	0 14 57	0 19 13	0 25 5	0 32 39	0 40 52	0 50 19	1 0 22	1 11 22	1 22 40	1 34 31	1 46 45	1 59 27	2 12 10	2 25 9
6	0 13 8	0 18 14	0 25 59	0 35 34	0 46 54	0 58 58	1 11 33	1 24 38	1 38 8	1 51 52	2 5 47	2 17 55	2 34 5	2 48 22	3 2 39
7	Not calculable.														
8	0 13 14	0 18 14	0 26 3	0 35 39	0 46 45	0 58 30	1 11 20	1 24 21	1 38 2	1 51 43	2 5 28	2 19 23	2 35 35	2 47 56	3 2 11
9	0 12 3	0 14 57	0 18 28	0 25 9	0 32 22	0 40 43	0 50 5	1 0 12	1 10 50	1 22 17	1 34 2	1 46 4	1 58 36	2 11 23	2 24 19
10	0 11 58	0 13 42	0 16 38	0 20 46	0 25 56	0 32 2	0 39 1	0 46 44	0 55 19	1 4 29	1 14 10	1 24 20	1 35 11	1 46 4	1 57 20
11	0 11 34	0 13 1	0 15 13	0 18 20	0 22 23	0 27 9	0 32 38	0 38 47	0 45 40	0 53 14	1 1 14	1 9 50	1 18 51	1 28 23	1 38 14
12	0 11 34	0 12 37	0 14 12	0 16 48	0 20 14	0 23 57	0 28 30	0 33 37	0 39 21	0 45 40	0 52 25	0 59 41	1 7 30	1 15 41	1 24 17
13	0 11 30	0 12 22	0 13 47	0 15 53	0 18 40	0 21 49	0 25 40	0 29 57	0 34 54	0 40 14	0 46 3	0 52 24	0 59 10	1 6 16	1 13 44
14	0 11 24	0 12 13	0 13 27	0 15 13	0 17 34	0 20 21	0 23 37	0 27 19	0 31 30	0 36 14	0 41 21	0 46 49	0 52 44	0 59 4	1 5 47
15	0 11 18	0 12 2	0 13 9	0 14 43	0 16 43	0 19 17	0 21 54	0 25 14	0 28 53	0 33 1	0 37 35	0 42 29	0 47 37	0 53 17	0 59 16
16	0 11 18	0 11 51	0 13 3	0 14 14	0 16 6	0 18 15	0 20 43	0 23 40	0 27 6	0 30 41	0 34 42	0 39 7	0 43 50	0 48 53	0 54 17
17	0 11 17	0 11 46	0 12 39	0 13 53	0 15 32	0 17 29	0 19 45	0 22 23	0 25 25	0 28 41	0 32 22	0 36 17	0 40 39	0 45 11	0 50 2
18	0 11 13	0 11 42	0 12 30	0 13 38	0 15 9	0 16 49	0 18 54	0 21 21	0 23 58	0 27 3	0 30 21	0 33 52	0 37 51	0 42 0	0 46 30
19	0 11 12	0 11 37	0 12 20	0 13 22	0 14 42	0 16 15	0 18 13	0 20 22	0 22 52	0 25 37	0 28 40	0 32 0	0 35 37	0 39 26	0 43 31
20	0 11 9	0 11 32	0 12 16	0 13 7	0 14 22	0 15 52	0 17 35	0 19 35	0 21 55	0 24 27	0 27 18	0 30 19	0 33 38	0 37 12	0 40 59
21	0 11 9	0 11 31	0 12 8	0 12 58	0 14 7	0 15 30	0 17 10	0 18 59	0 21 7	0 23 26	0 26 3	0 28 52	0 31 58	0 35 16	0 38 47
22	0 11 6	0 11 24	0 12 1	0 12 48	0 13 51	0 15 6	0 16 38	0 18 21	0 20 21	0 22 3	0 24 58	0 27 32	0 30 26	0 33 30	0 36 47
23	0 11 4	0 11 23	0 11 55	0 12 40	0 13 40	0 14 53	0 16 13	0 17 52	0 19 43	0 21 45	0 24 0	0 26 33	0 29 9	0 32 1	0 35 10

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 11 24	0 12 7	0 13 32	0 15 22	0 17 46	0 20 39	0 23 58	0 27 47	0 32 15	0 36 59	0 42 16	0 47 53	0 54 0	1 0 39	1 7 22
1	0 11 21	0 12 0	0 13 14	0 14 47	0 16 56	0 19 29	0 22 26	0 25 46	0 29 40	0 33 53	0 38 35	0 43 37	0 48 58	0 54 51	1 0 58
2	0 11 19	0 11 54	0 12 56	0 14 25	0 16 20	0 18 34	0 21 12	0 24 13	0 27 41	0 31 30	0 35 42	0 40 13	0 45 8	0 50 35	0 55 59
3	0 11 17	0 11 49	0 12 45	0 14 1	0 15 46	0 17 46	0 20 12	0 22 53	0 26 1	0 29 30	0 33 18	0 37 24	0 41 46	0 46 40	0 51 39
4	0 11 16	0 11 45	0 12 36	0 13 46	0 15 22	0 17 11	0 19 22	0 21 50	0 24 43	0 27 51	0 31 20	0 35 6	0 39 6	0 43 37	0 48 10
5	0 11 14	0 11 43	0 12 28	0 13 34	0 15 0	0 16 39	0 18 40	0 20 58	0 23 36	0 26 29	0 29 40	0 33 8	0 36 48	0 40 59	0 45 11
6	0 11 12	0 11 37	0 12 21	0 13 20	0 14 37	0 16 13	0 18 4	0 20 11	0 22 36	0 25 17	0 28 20	0 31 37	0 34 55	0 38 43	0 42 36
7	0 11 11	0 11 35	0 12 14	0 13 10	0 14 23	0 15 48	0 17 33	0 19 32	0 21 45	0 24 18	0 27 2	0 29 59	0 33 7	0 36 45	0 40 23
8	0 11 10	0 11 32	0 12 9	0 12 58	0 14 8	0 15 29	0 17 6	0 18 56	0 21 16	0 23 24	0 25 57	0 28 44	0 31 13	0 35 4	0 38 28
9	0 11 9	0 11 29	0 12 3	0 12 50	0 13 53	0 15 11	0 16 41	0 18 26	0 20 23	0 22 36	0 24 59	0 27 36	0 29 54	0 33 34	0 36 46
10	0 11 8	0 11 26	0 11 58	0 12 44	0 13 44	0 14 56	0 16 21	0 17 55	0 19 49	0 21 53	0 24 8	0 26 36	0 29 19	0 32 13	0 35 19
11	0 11 7	0 11 20	0 11 49	0 12 33	0 13 29	0 14 37	0 15 58	0 17 29	0 19 11	0 21 12	0 23 20	0 25 40	0 28 13	0 30 58	0 33 53
12	0 11 2	0 11 17	0 11 45	0 12 26	0 13 20	0 14 23	0 15 40	0 17 6	0 18 45	0 20 35	0 22 38	0 24 51	0 27 18	0 29 53	0 32 41
13	0 11 1	0 11 16	0 11 41	0 12 21	0 13 14	0 14 11	0 15 24	0 16 45	0 18 20	0 20 7	0 22 1	0 24 5	0 26 24	0 28 50	0 31 29
14	0 10 58	0 11 14	0 11 37	0 12 14	0 13 4	0 14 1	0 15 7	0 16 30	0 18 2	0 19 39	0 21 27	0 23 27	0 25 41	0 27 58	0 30 28
15	0 10 56	0 11 11	0 11 35	0 12 9	0 12 56	0 13 50	0 14 55	0 16 9	0 17 35	0 19 10	0 20 54	0 22 49	0 24 53	0 27 7	0 29 30
16	0 10 54	0 11 9	0 11 31	0 12 6	0 12 50	0 13 44	0 14 45	0 15 55	0 17 18	0 18 48	0 20 26	0 22 16	0 24 16	0 26 23	0 28 41
17	0 10 53	0 11 7	0 11 28	0 12 1	0 12 43	0 13 34	0 14 32	0 15 39	0 16 59	0 18 22	0 20 0	0 21 44	0 23 38	0 25 43	0 27 52
18	0 10 50	0 11 5	0 11 25	0 11 57	0 12 35	0 13 23	0 14 19	0 15 26	0 16 42	0 18 2	0 19 34	0 21 16	0 23 5	0 25 2	0 27 8
19	0 10 50	0 11 3	0 11 23	0 11 52	0 12 30	0 13 17	0 14 12	0 15 13	0 16 24	0 17 43	0 19 11	0 20 48	0 22 33	0 24 27	0 26 26
20	0 10 49	0 11 0	0 11 19	0 11 48	0 12 24	0 13 10	0 14 2	0 15 2	0 16 11	0 17 27	0 18 52	0 20 25	0 22 6	0 23 51	0 25 48
21	0 10 49	0 10 59	0 11 17	0 11 44	0 12 19	0 13 3	0 13 52	0 14 49	0 15 55	0 17 10	0 18 31	0 19 59	0 21 35	0 23 19	0 25 12
22	0 10 47	0 10 57	0 11 14	0 11 40	0 12 15	0 12 56	0 13 45	0 14 39	0 15 44	0 16 54	0 18 12	0 19 37	0 21 11	0 22 52	0 24 38
23	0 10 45	0 10 54	0 11 11	0 11 36	0 12 9	0 12 48	0 13 35	0 14 30	0 15 30	0 16 38	0 17 52	0 19 14	0 20 44	0 22 21	0 24 4

LATITUDE 7° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 14 35	1 22 11	1 30 3	1 38 20	1 46 51	1 55 46	2 4 49	2 14 4	2 23 41	2 33 37	2 43 38	2 53 51	3 4 20	3 14 59	3 25 48
1	1 23 27	1 31 50	1 40 42	1 49 46	1 59 12	2 8 57	2 18 51	2 29 2	2 39 32	2 50 13	3 1 3	3 12 1*	3 23 20	3 34 47	3 46 23
2	1 34 47	1 44 24	1 54 12	2 4 14	2 14 40	2 25 24	2 36 20	2 47 25	2 58 48	3 10 20	3 22 4	3 33 56	3 46 5	3 58 17	4 10 44
3	1 49 55	2 0 44	2 12 0	2 22 55	2 34 25	2 46 16	2 58 9	3 10 18	3 22 38	3 35 8	3 47 47	4 0 32	4 13 27	4 26 29	4 39 38
4	2 10 15	2 22 27	2 34 41	2 47 7	2 59 51	3 12 43	3 25 44	3 38 59	3 42 9	4 5 34	4 19 4	4 32 39	4 46 18	5 0 9	5 13 56
5	2 38 17	2 51 50	3 5 19	3 18 56	3 32 46	3 46 42	4 0 36	4 14 39	4 28 48	4 43 3	4 57 6	5 11 27	5 25 48	5 40 10	5 54 32
6	3 17 2	3 31 34	3 46 4	4 0 38	4 15 17	4 30 3	4 44 34	4 59 10	5 13 44	5 28 40	5 43 17	5 57 58	6 12 47	6 27 33	6 42 19
7	Not calculable.														
8	3 16 32	3 31 9	3 45 36	3 59 58	4 14 34	4 29 11	4 43 49	4 58 32	5 13 6	5 27 51	5 42 33	5 57 8	6 11 52	6 26 34	6 41 22
9	2 37 27	2 50 53	3 4 19	3 17 56	3 31 38	3 45 33	3 59 23	4 13 22	4 27 19	4 41 30	4 55 38	5 9 51	5 24 8	5 38 26	5 52 43
10	2 9 1	2 21 4	2 33 21	2 45 42	2 58 16	3 10 59	3 23 57	3 36 59	3 50 12	4 3 32	4 16 52	4 30 19	4 43 54	4 57 35	5 11 21
11	1 48 28	1 59 2	2 9 55	2 21 4	2 32 26	2 43 58	2 55 16	3 7 51	3 19 7	3 32 24	3 44 58	3 57 35	4 10 21	4 23 11	4 36 42
12	1 33 10	1 41 34	1 51 13	2 2 11	2 14 3	2 22 52	2 33 40	2 44 42	2 55 51	3 7 15	3 18 47	3 30 34	3 42 29	3 54 34	4 6 43
13	1 21 40	1 29 59	1 38 36	1 48 32	1 56 45	2 6 18	2 15 58	2 25 57	2 36 16	2 46 47	2 57 25	3 8 16	3 19 18	3 30 36	3 41 54
14	1 12 43	1 20 11	1 27 54	1 35 53	1 44 14	1 52 51	2 1 46	2 10 51	2 20 12	2 29 52	2 39 40	2 49 41	2 59 55	3 10 29	3 20 59
15	1 5 39	1 12 17	1 19 13	1 26 24	1 33 59	1 42 38	1 49 54	1 58 15	2 6 54	2 15 46	2 25 2	2 34 1	2 43 30	2 53 11	3 3 4
16	0 59 58	1 5 59	1 12 24	1 18 50	1 25 45	1 32 57	1 40 20	1 47 59	1 55 55	2 4 4	2 12 26	2 20 56	2 29 44	2 38 47	2 47 58
17	0 55 15	1 0 44	1 6 30	1 12 30	1 18 46	1 25 25	1 32 9	1 39 15	1 46 31	1 54 1	2 1 48	2 9 45	2 17 50	2 26 20	2 34 49
18	0 51 11	0 56 18	1 1 32	1 7 2	1 12 53	1 18 58	1 25 15	1 31 43	1 38 29	1 45 26	1 52 41	2 0 6	2 7 43	2 15 27	2 23 30
19	0 47 54	0 52 31	0 57 26	1 2 32	1 7 55	1 13 33	1 19 20	1 25 24	1 31 37	1 38 10	1 44 52	1 51 45	1 58 52	2 6 13	2 13 42
20	0 44 59	0 49 21	0 53 50	0 58 34	1 3 34	1 8 48	1 14 10	1 19 51	1 25 40	1 31 47	1 37 56	1 44 25	1 51 7	1 57 58	2 4 59
21	0 42 31	0 46 32	0 50 45	0 55 11	0 59 47	1 4 43	1 9 40	1 14 59	1 20 23	1 26 4	1 31 55	1 37 57	1 44 10	1 50 33	1 57 11
22	0 40 16	0 44 1	0 47 54	0 52 2	0 56 23	1 0 59	1 5 38	1 10 36	1 15 43	1 21 2	1 26 29	1 32 10	1 38 4	1 43 59	1 50 11
23	0 38 26	0 41 50	0 45 31	0 49 22	0 53 25	0 57 44	1 2 8	1 6 46	1 11 34	1 16 33	1 21 40	1 27 3	1 32 33	1 38 14	1 44 8

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 14 35	1 22 11	1 30 3	1 38 20	1 46 51	1 55 46	2 4 49	2 14 4	2 23 41	2 33 37	2 43 38	2 53 51	3 4 20	3 14 59	3 25 48
1	1 7 35	1 14 27	1 21 35	1 29 4	1 36 46	1 44 56	1 53 14	2 1 46	2 10 39	2 19 47	2 28 59	2 38 30	2 48 17	2 58 15	3 8 23
2	1 1 53	1 8 8	1 14 39	1 21 31	1 28 35	1 36 4	1 43 40	1 51 31	1 59 43	2 8 12	2 16 45	2 25 36	2 34 42	2 44 1	2 53 29
3	0 57 8	1 2 58	1 9 4	1 15 16	1 21 39	1 28 33	1 35 34	1 42 50	1 50 27	1 58 21	2 6 19	2 14 32	2 23 0	2 31 44	2 40 36
4	0 53 13	0 58 29	1 4 1	1 9 50	1 15 49	1 22 13	1 28 43	1 35 28	1 42 34	1 49 56	1 57 21	2 5 1	2 12 56	2 21 8	2 29 27
5	0 49 52	0 54 44	0 59 52	1 5 17	1 10 52	1 16 48	1 22 49	1 29 6	1 35 44	1 42 36	1 49 30	1 56 44	2 4 12	2 11 53	2 19 40
6	0 46 57	0 51 29	0 56 16	1 1 20	1 6 34	1 12 6	1 17 42	1 23 34	1 29 46	1 36 14	1 42 44	1 49 31	1 56 31	2 3 45	2 11 4
7	0 44 29	0 48 44	0 53 13	0 57 55	1 2 46	1 7 58	1 13 13	1 18 44	1 24 34	1 30 39	1 36 45	1 43 8	1 49 44	1 56 34	2 3 28
8	0 42 17	0 46 19	0 50 28	0 54 48	0 59 25	1 4 15	1 9 17	1 14 34	1 19 59	1 25 37	1 31 28	1 37 31	1 43 40	1 49 58	1 56 40
9	0 40 22	0 44 8	0 48 1	0 52 7	0 56 30	1 1 4	1 5 50	1 10 46	1 15 49	1 21 9	1 26 41	1 32 27	1 38 19	1 44 16	1 50 37
10	0 38 36	0 42 7	0 45 52	0 49 45	0 53 51	0 58 18	1 2 48	1 7 29	1 12 11	1 17 12	1 22 27	1 27 54	1 33 30	1 39 16	1 45 13
11	0 37 1	0 40 20	0 43 51	0 47 33	0 51 26	0 55 30	0 59 45	1 4 12	1 8 49	1 13 33	1 18 33	1 23 39	1 29 0	1 34 27	1 40 7
12	0 35 39	0 38 50	0 42 9	0 45 34	0 49 15	0 53 7	0 57 6	1 1 18	1 5 40	1 10 21	1 15 3	1 19 57	1 25 0	1 30 14	1 35 34
13	0 34 19	0 37 21	0 40 28	0 43 50	0 47 21	0 51 1	0 54 51	0 58 49	1 3 0	1 7 21	1 11 52	1 16 32	1 21 20	1 26 20	1 31 29
14	0 33 10	0 36 2	0 39 3	0 42 16	0 45 37	0 49 15	0 52 50	0 56 40	1 0 33	1 4 48	1 8 59	1 13 26	1 18 1	1 22 46	1 27 40
15	0 32 2	0 34 47	0 37 39	0 40 39	0 43 50	0 47 13	0 50 44	0 54 24	0 58 9	1 2 14	1 6 15	1 10 30	1 14 52	1 19 26	1 24 7
16	0 31 8	0 33 46	0 36 28	0 39 23	0 42 27	0 45 38	0 49 0	0 52 31	0 56 10	0 59 58	1 3 50	1 7 52	1 12 3	1 16 20	1 20 51
17	0 30 11	0 32 42	0 35 20	0 38 6	0 40 59	0 44 5	0 47 18	0 50 41	0 54 8	0 57 46	1 1 32	1 5 25	1 9 26	1 13 35	1 17 51
18	0 29 22	0 31 46	0 34 17	0 36 57	0 39 43	0 42 40	0 45 45	0 48 57	0 52 18	0 55 47	0 59 25	1 3 9	1 7 2	1 11 3	1 15 15
19	0 28 34	0 30 52	0 33 18	0 35 50	0 38 30	0 41 22	0 44 18	0 47 24	0 50 36	0 53 59	0 57 26	1 1 2	1 4 44	1 8 33	1 12 32
20	0 27 52	0 30 4	0 32 23	0 34 47	0 37 20	0 40 4	0 42 53	0 45 52	0 48 56	0 52 12	0 55 30	0 58 57	1 2 37	1 6 21	1 10 10
21	0 27 9	0 29 16	0 31 30	0 33 52	0 36 20	0 38 57	0 41 38	0 44 30	0 47 28	0 50 35	0 53 47	0 57 7	1 0 37	1 4 7	1 7 52
22	0 26 30	0 28 33	0 30 42	0 32 57	0 35 20	0 37 52	0 40 29	0 43 17	0 46 9	0 49 7	0 52 14	0 55 24	0 58 45	1 2 18	1 5 46
23	0 25 54	0 27 50	0 29 55	0 32 6	0 34 24	0 36 50	0 39 21	0 41 59	0 44 46	0 47 38	0 50 36	0 53 43	0 56 54	1 0 14	1 3 39

LATITUDE 7° NORTH OR SOUTH.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	3 36 49	3 47 59	3 59 19	4 10 49	4 22 25	4 34 4	4 46 2	4 58 0	5 10 3	5 22 14	5 34 34	5 46 41	5 59 25	6 11 55	6 24 39
1	3 18 46	3 29 17	3 39 53	3 50 39	4 1 39	4 12 41	4 24 2	4 35 22	4 46 51	4 58 28	5 10 20	5 21 59	5 34 6	5 45 59	5 58 12
2	3 3 9	3 12 57	3 23 0	3 33 13	3 43 37	3 54 2	4 4 47	4 15 30	4 26 25	4 37 27	4 48 48	4 59 55	5 11 30	5 22 50	5 34 33
3	2 49 42	2 58 55	3 8 20	3 17 55	3 27 46	3 37 37	3 47 48	3 57 57	4 8 19	4 18 47	4 29 38	4 40 14	4 51 19	5 2 9	5 13 22
4	2 37 59	2 46 38	2 55 32	3 4 35	3 13 55	3 23 11	3 32 51	3 42 29	3 52 21	4 2 19	4 12 38	4 22 42	4 33 17	4 43 36	4 54 20
5	2 27 42	2 35 51	2 44 16	2 52 49	3 1 39	3 10 25	3 19 35	3 28 43	3 38 5	3 47 33	3 57 23	4 6 58	4 17 5	4 26 55	4 37 11
6	2 18 40	2 26 22	2 34 19	2 42 24	2 50 46	2 59 3	3 7 44	3 16 23	3 25 19	3 34 20	3 43 44	3 52 52	4 2 30	4 11 51	4 21 41
7	2 10 38	2 17 54	2 25 26	2 33 5	2 41 2	2 48 54	2 57 10	3 5 23	3 13 53	3 22 27	3 31 24	3 40 5	3 49 20	3 58 18	4 7 41
8	2 3 22	2 10 23	2 17 32	2 24 46	2 32 14	2 39 47	2 47 35	2 55 27	3 3 31	3 11 44	3 20 7	3 28 35	3 37 21	3 45 57	3 54 53
9	1 56 58	2 3 37	2 10 25	2 17 17	2 24 23	2 31 33	2 39 0	2 46 30	2 54 11	3 2 1	3 10 2	3 18 7	3 26 30	3 34 42	3 43 16
10	1 51 19	1 57 36	2 4 2	2 10 37	2 17 22	2 24 16	2 31 20	2 38 34	2 45 18	2 52 11	3 0 19	3 8 35	3 16 25	3 24 32	3 32 43
11	1 45 53	1 51 51	1 57 58	2 4 15	2 10 40	2 17 15	2 23 58	2 30 49	2 37 50	2 45 1	2 52 18	2 59 44	3 7 18	3 15 0	3 22 47
12	1 41 5	1 46 47	1 52 37	1 58 38	2 4 46	2 11 1	2 17 26	2 24 2	2 30 44	2 37 35	2 44 36	2 51 43	2 58 57	3 6 18	3 13 49
13	1 36 53	1 42 17	1 47 53	1 53 35	1 59 27	2 5 28	2 11 39	2 17 53	2 24 20	2 30 54	2 37 37	2 44 27	2 51 23	2 58 29	3 5 35
14	1 32 43	1 37 54	1 43 15	1 48 44	1 54 20	2 0 6	2 5 59	2 12 1	2 18 11	2 24 28	2 30 54	2 37 28	2 44 8	2 51 57	2 57 52
15	1 29 2	1 34 0	1 39 6	1 44 21	1 49 43	1 55 15	2 0 54	2 6 41	2 12 37	2 18 40	2 24 49	2 31 7	2 37 32	2 44 6	2 50 45
16	1 25 28	1 30 13	1 35 10	1 40 15	1 45 25	1 50 35	1 56 0	2 1 35	2 7 16	2 13 5	2 19 1	2 25 5	2 31 15	2 37 32	2 43 59
17	1 22 22	1 26 59	1 31 43	1 36 33	1 41 31	1 46 35	1 51 49	1 57 10	2 2 38	2 8 13	2 13 55	2 19 44	2 25 41	2 31 44	2 37 56
18	1 19 29	1 23 50	1 28 21	1 33 1	1 37 47	1 42 41	1 47 43	1 52 52	1 58 8	2 3 30	2 8 59	2 14 35	2 20 19	2 26 10	2 32 7
19	1 16 46	1 20 55	1 25 13	1 29 44	1 34 20	1 39 3	1 43 45	1 48 51	1 53 56	1 59 6	2 4 24	2 9 48	2 15 19	2 20 57	2 26 43
20	1 14 7	1 18 11	1 22 22	1 26 40	1 31 5	1 35 37	1 40 17	1 45 4	1 49 57	1 54 57	2 0 4	2 5 18	2 10 37	2 16 2	2 21 35
21	1 11 42	1 15 46	1 19 49	1 23 57	1 28 12	1 32 27	1 36 56	1 41 34	1 46 17	1 51 6	1 56 2	2 1 3	2 6 11	2 11 25	2 16 46
22	1 9 25	1 13 11	1 17 5	1 21 6	1 25 13	1 29 26	1 33 45	1 38 16	1 42 46	1 47 24	1 52 10	1 57 1	2 2 0	2 7 4	2 12 12
23	1 7 11	1 10 53	1 14 38	1 18 31	1 22 31	1 26 37	1 30 49	1 35 6	1 39 29	1 43 57	1 48 28	1 53 10	1 57 59	2 2 55	2 7 55

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	6 37 21	6 50 10	7 3 4	7 15 59	7 28 59	7 42 5	7 55 13	8 8 29	8 21 41	8 35 1	8 48 21	9 1 48	9 15 15	9 28 43	9 42 17
1	6 10 23	6 22 41	6 35 4	6 47 34	7 0 8	7 12 47	7 25 28	7 38 19	7 51 6	8 4 0	8 16 54	8 29 58	8 43 2	8 56 8	9 9 19
2	5 46 14	5 58 4	6 9 59	6 21 57	6 33 59	6 46 14	6 58 31	7 10 57	7 23 18	7 35 48	7 48 18	8 0 58	8 13 37	8 26 21	8 39 10
3	5 24 32	5 35 52	5 47 17	5 58 52	6 10 30	6 22 14	6 33 59	6 46 0	6 57 55	7 10 29	7 22 3	7 34 20	7 46 36	7 58 57	8 11 22
4	5 5 0	5 15 52	5 26 48	5 37 55	5 49 5	6 0 24	6 11 43	6 23 18	6 34 46	6 46 56	6 58 6	7 9 58	7 21 48	7 33 45	7 45 46
5	4 47 23	4 57 49	5 8 19	5 18 58	5 29 40	5 40 33	5 51 26	6 2 36	6 13 38	6 25 24	6 36 9	6 47 37	6 59 3	7 10 37	7 22 14
6	4 31 27	4 41 27	4 51 30	5 1 43	5 11 58	5 22 27	5 32 55	5 43 41	5 54 18	6 5 38	6 15 57	6 27 3	6 38 7	6 49 19	7 0 33
7	4 16 59	4 26 30	4 36 13	4 45 58	4 55 54	5 5 57	5 15 59	5 26 21	5 36 33	5 47 33	5 57 31	6 8 11	6 18 48	6 29 38	6 40 30
8	4 3 53	4 12 59	4 22 17	4 31 42	4 41 11	4 50 52	5 0 30	5 10 24	5 20 18	5 30 32	5 40 28	5 50 45	6 1 2	6 11 29	6 21 58
9	3 51 53	4 0 37	4 9 32	4 18 34	4 27 40	4 37 0	4 46 16	4 55 48	5 5 20	5 15 11	5 24 44	5 34 40	5 44 35	5 54 41	6 4 49
10	3 40 59	3 49 24	3 57 56	4 6 36	4 15 22	4 24 15	4 33 13	4 42 21	4 51 34	5 0 54	5 10 19	5 19 51	5 29 28	5 39 15	5 49 0
11	3 30 44	3 38 48	3 47 1	3 55 21	4 3 46	4 12 19	4 20 58	4 29 44	4 38 36	4 47 35	4 56 41	5 5 52	5 15 10	5 24 32	5 34 3
12	3 21 26	3 29 13	3 37 6	3 45 6	3 53 12	4 1 25	4 9 44	4 18 12	4 26 45	4 35 25	4 44 10	4 53 2	5 2 0	5 11 5	5 20 14
13	3 13 3	3 20 30	3 28 6	3 35 49	3 43 37	3 51 33	3 59 35	4 7 45	4 16 0	4 24 21	4 32 48	4 41 25	4 50 4	4 58 49	5 7 41
14	3 4 56	3 12 5	3 19 22	3 26 46	3 34 18	3 41 55	3 49 39	3 57 30	4 5 27	4 13 31	4 21 39	4 29 57	4 38 19	4 46 47	4 55 21
15	2 57 32	3 4 26	3 11 28	3 18 35	3 25 49	3 33 11	3 40 38	3 48 13	3 55 54	4 4 41	4 11 34	4 19 33	4 27 38	4 35 50	4 44 7
16	2 50 32	2 57 11	3 4 9	3 11 1	3 17 58	3 25 2	3 32 14	3 39 33	3 46 57	3 54 26	4 2 0	4 9 43	4 17 35	4 25 30	4 33 27
17	2 44 14	2 50 38	2 57 9	3 3 46	3 10 30	3 17 19	3 24 15	3 31 19	3 38 30	3 45 45	3 53 6	4 0 32	4 8 5	4 15 43	4 23 25
18	2 38 12	2 44 23	2 50 40	2 57 3	3 3 33	3 10 8	3 16 50	3 23 37	3 30 30	3 37 33	3 44 43	3 51 57	3 59 15	4 6 38	4 14 6
19	2 32 33	2 38 32	2 44 34	2 50 46	2 57 2	3 3 25	3 9 53	3 16 28	3 23 7	3 29 55	3 36 46	3 43 47	3 50 48	3 57 58	4 5 12
20	2 27 15	2 33 1	2 38 52	2 44 49	2 50 53	2 57 3	3 3 19	3 9 41	3 16 8	3 22 42	3 29 22	3 36 8	3 42 59	3 49 56	3 56 58
21	2 22 15	2 27 49	2 33 28	2 39 14	2 45 7	2 51 6	2 57 10	3 3 19	3 9 34	3 15 55	3 22 21	3 28 52	3 35 30	3 42 13	3 49 0
22	2 17 31	2 22 53	2 28 21	2 33 56	2 39 36	2 45 22	2 51 14	2 57 11	3 3 13	3 9 23	3 15 34	3 21 59	3 28 21	3 34 48	3 41 29
23	2 13 1	2 18 12	2 23 30	2 28 53	2 34 24	2 39 57	2 45 38	2 51 25	2 57 18	3 3 25	3 9 27	3 15 34	3 21 41	3 27 59	3 34 21

LATITUDE 8° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 11 21	0 12 0	0 13 12	0 14 47	0 16 51	0 19 27	0 22 26	0 25 47	0 29 38	0 33 50	0 38 33	0 43 34	0 48 58	0 54 48	1 0 53
1	0 11 25	0 12 14	0 13 29	0 15 23	0 17 45	0 20 35	0 24 2	0 27 51	0 32 9	0 36 57	0 42 11	0 47 49	0 53 50	1 0 22	1 7 13
2	0 11 32	0 12 26	0 13 53	0 15 57	0 18 49	0 22 5	0 25 57	0 30 28	0 35 30	0 40 54	0 46 52	0 53 20	1 0 12	1 7 34	1 15 12
3	0 11 36	0 12 39	0 14 27	0 16 56	0 20 16	0 24 15	0 28 47	0 33 59	0 39 48	0 46 14	0 53 10	1 0 34	1 8 32	1 16 45	1 25 28
4	0 11 40	0 13 6	0 15 19	0 18 31	0 22 34	0 27 21	0 32 58	0 39 16	0 46 12	0 53 46	1 2 0	1 10 34	1 19 51	1 29 24	1 39 20
5	0 11 50	0 13 42	0 16 38	0 20 50	0 26 2	0 32 5	0 39 11	0 47 5	0 56 35	1 5 41	1 14 35	1 24 53	1 35 30	1 46 40	1 58 7
6	0 12 9	0 14 57	0 19 13	0 25 7	0 32 25	0 40 48	0 50 10	1 0 19	1 11 2	1 22 17	1 34 13	1 46 25	1 58 56	2 11 41	2 24 39
7	0 13 14	0 18 14	0 26 3	0 35 39	0 46 45	0 58 30	1 11 20	1 24 21	1 38 2	1 51 43	2 5 28	2 19 23	2 35 35	2 47 56	3 2 11
8	Not calculable.														
9	0 12 56	0 18 14	0 25 48	0 35 32	0 46 39	0 58 38	1 11 4	1 24 14	1 37 34	1 51 14	2 5 3	2 19 7	2 33 18	2 47 28	3 1 39
10	0 12 21	0 14 46	0 19 13	0 24 53	0 32 13	0 40 39	0 49 48	0 59 42	1 10 37	1 21 46	1 33 35	1 45 38	1 58 9	2 10 45	2 23 43
11	0 11 42	0 13 34	0 16 30	0 20 38	0 25 46	0 31 58	0 38 54	0 46 36	0 55 5	1 4 8	1 13 47	1 23 56	1 34 33	1 45 33	1 56 59
12	0 11 40	0 12 55	0 15 13	0 18 18	0 22 24	0 26 55	0 32 27	0 38 40	0 45 39	0 53 0	1 0 58	1 9 30	1 18 35	1 27 56	1 37 44
13	0 11 32	0 12 37	0 14 23	0 16 45	0 20 10	0 23 50	0 28 25	0 33 30	0 39 19	0 45 30	0 52 14	0 59 32	1 7 21	1 15 25	1 23 55
14	0 11 28	0 12 22	0 13 45	0 15 49	0 18 16	0 21 45	0 25 35	0 29 49	0 34 41	0 40 1	0 45 51	0 52 3	0 58 49	1 5 57	1 13 23
15	0 11 21	0 12 10	0 13 26	0 15 13	0 17 31	0 20 18	0 23 28	0 27 15	0 31 25	0 36 5	0 41 7	0 46 36	0 52 28	0 58 41	1 5 26
16	0 11 21	0 11 57	0 13 7	0 14 38	0 16 40	0 19 8	0 21 53	0 25 13	0 28 56	0 32 57	0 37 30	0 42 20	0 47 34	0 53 11	0 59 4
17	0 11 19	0 11 51	0 12 53	0 14 11	0 16 0	0 18 5	0 20 38	0 23 31	0 26 47	0 30 30	0 34 29	0 38 53	0 43 26	0 48 34	0 53 53
18	0 11 17	0 11 45	0 12 38	0 13 52	0 15 32	0 17 25	0 19 42	0 22 18	0 25 17	0 28 35	0 32 11	0 36 7	0 40 22	0 44 56	0 49 45
19	0 11 14	0 11 41	0 12 27	0 13 33	0 15 0	0 16 41	0 18 48	0 21 10	0 23 52	0 26 52	0 30 8	0 33 42	0 37 35	0 41 42	0 46 7
20	0 11 10	0 11 35	0 12 23	0 13 16	0 14 40	0 16 12	0 18 4	0 20 14	0 22 49	0 25 28	0 28 30	0 31 46	0 35 16	0 39 9	0 43 10
21	0 11 10	0 11 33	0 12 13	0 13 8	0 14 21	0 15 49	0 17 33	0 19 32	0 21 51	0 24 20	0 27 8	0 30 9	0 33 26	0 36 57	0 40 41
22	0 11 7	0 11 26	0 12 7	0 12 56	0 14 4	0 15 21	0 17 0	0 18 53	0 20 59	0 23 17	0 25 54	0 28 38	0 31 41	0 34 56	0 38 29
23	0 11 6	0 11 26	0 12 1	0 12 47	0 13 50	0 15 8	0 16 34	0 18 18	0 20 18	0 22 26	0 24 48	0 27 26	0 30 16	0 33 18	0 36 43

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 11 21	0 12 0	0 13 12	0 14 47	0 16 51	0 19 27	0 22 26	0 25 47	0 29 38	0 33 50	0 38 33	0 43 34	0 48 58	0 54 48	1 0 53
1	0 11 20	0 11 58	0 12 59	0 14 25	0 16 17	0 18 33	0 21 19	0 24 15	0 27 41	0 31 29	0 35 41	0 40 11	0 45 2	0 50 18	0 55 48
2	0 11 20	0 11 50	0 12 45	0 14 0	0 15 45	0 17 45	0 20 10	0 22 52	0 26 0	0 29 29	0 33 17	0 37 23	0 41 49	0 46 40	0 51 39
3	0 11 18	0 11 45	0 12 36	0 13 46	0 15 20	0 17 11	0 19 22	0 21 50	0 24 41	0 27 50	0 31 19	0 35 5	0 39 8	0 43 35	0 48 9
4	0 11 14	0 11 41	0 12 29	0 13 33	0 14 55	0 16 38	0 18 38	0 20 56	0 23 34	0 26 27	0 29 39	0 33 7	0 36 50	0 40 57	0 45 10
5	0 11 12	0 11 39	0 12 21	0 13 21	0 14 38	0 16 12	0 18 3	0 20 11	0 22 34	0 25 14	0 28 13	0 31 27	0 34 53	0 38 42	0 42 36
6	0 11 11	0 11 35	0 12 14	0 13 10	0 14 22	0 15 50	0 17 33	0 19 32	0 21 46	0 24 14	0 27 0	0 30 1	0 33 12	0 36 45	0 40 24
7	0 11 10	0 11 32	0 12 9	0 12 58	0 14 8	0 15 29	0 17 6	0 18 56	0 21 4	0 23 24	0 25 57	0 28 44	0 31 43	0 35 4	0 38 28
8	0 11 9	0 11 30	0 12 4	0 12 53	0 13 56	0 15 11	0 16 42	0 18 25	0 20 25	0 22 36	0 25 0	0 27 38	0 30 26	0 33 35	0 36 46
9	0 11 6	0 11 27	0 11 56	0 12 43	0 13 43	0 14 53	0 16 20	0 17 57	0 19 48	0 21 51	0 24 7	0 26 37	0 29 16	0 32 15	0 35 14
10	0 11 6	0 11 24	0 11 53	0 12 37	0 13 33	0 14 41	0 16 2	0 17 31	0 19 18	0 21 16	0 23 23	0 25 43	0 28 17	0 31 1	0 33 53
11	0 11 0	0 11 18	0 11 46	0 12 27	0 13 20	0 14 25	0 15 39	0 17 9	0 18 46	0 20 37	0 22 39	0 24 51	0 27 18	0 29 55	0 32 41
12	0 11 0	0 11 15	0 11 41	0 12 20	0 13 12	0 14 12	0 15 25	0 16 47	0 18 21	0 20 6	0 22 3	0 24 9	0 26 29	0 28 56	0 31 35
13	0 10 59	0 11 14	0 11 38	0 12 16	0 13 6	0 14 0	0 15 9	0 16 27	0 17 57	0 19 39	0 21 28	0 23 27	0 25 39	0 27 58	0 30 29
14	0 10 56	0 11 11	0 11 33	0 12 9	0 12 56	0 13 51	0 14 54	0 16 13	0 17 41	0 19 13	0 20 56	0 22 51	0 24 59	0 27 10	0 29 33
15	0 10 54	0 11 9	0 11 32	0 12 5	0 12 49	0 13 41	0 14 43	0 15 54	0 17 16	0 18 47	0 20 27	0 22 17	0 24 16	0 26 24	0 28 41
16	0 10 53	0 11 7	0 11 28	0 12 2	0 12 44	0 13 35	0 14 34	0 15 41	0 17 1	0 18 27	0 20 1	0 21 46	0 23 42	0 25 43	0 27 56
17	0 10 52	0 11 5	0 11 25	0 11 57	0 12 37	0 13 26	0 14 22	0 15 26	0 16 43	0 18 4	0 19 37	0 21 17	0 23 7	0 25 7	0 27 11
18	0 10 49	0 11 3	0 11 22	0 11 53	0 12 30	0 13 16	0 14 10	0 15 14	0 16 27	0 17 44	0 19 13	0 20 51	0 22 36	0 24 28	0 26 30
19	0 10 48	0 11 1	0 11 20	0 11 48	0 12 25	0 13 10	0 14 3	0 15 2	0 16 10	0 17 26	0 18 51	0 20 25	0 22 6	0 23 56	0 25 51
20	0 10 48	0 10 58	0 11 17	0 11 44	0 12 19	0 13 4	0 13 54	0 14 52	0 15 59	0 17 12	0 18 34	0 20 4	0 21 41	0 23 22	0 25 15
21	0 10 47	0 10 57	0 11 14	0 11 40	0 12 15	0 12 57	0 13 44	0 14 39	0 15 43	0 16 56	0 18 14	0 19 39	0 21 12	0 22 52	0 24 41
22	0 10 45	0 10 55	0 11 12	0 11 37	0 12 11	0 12 50	0 13 37	0 14 30	0 15 33	0 16 41	0 17 56	0 19 18	0 20 49	0 22 27	0 24 10
23	0 10 43	0 10 52	0 11 9	0 11 33	0 12 5	0 12 43	0 13 28	0 14 22	0 15 9	0 16 25	0 17 37	0 18 56	0 20 24	0 21 57	0 23 37

LATITUDE 8° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 7 27	1 14 20	1 21 25	1 28 51	1 36 39	1 44 40	1 52 59	2 1 36	2 10 26	2 19 28	2 28 46	2 38 19	2 48 1	2 57 56	3 8 16
1	1 14 25	1 21 55	1 29 51	1 38 2	1 46 39	1 55 26	2 4 32	2 13 45	2 23 24	2 33 13	2 43 15	2 53 33	3 4 0	3 14 36	3 25 26
2	1 23 15	1 31 43	1 40 33	1 49 33	1 58 56	2 8 39	2 18 35	2 28 50	2 39 11	2 49 49	3 0 43	3 11 40	3 22 56	3 34 22	3 45 58
3	1 34 35	1 44 7	1 53 53	2 3 57	2 14 20	2 24 59	2 35 52	2 47 3	2 58 24	3 10 1	3 21 42	3 33 35	3 45 37	3 57 51	4 10 10
4	1 49 39	2 0 21	2 11 16	2 22 32	2 34 4	2 45 51	2 57 47	3 9 53	3 22 8	3 34 45	3 47 17	4 0 2	4 13 51	4 25 52	4 38 57
5	2 9 49	2 21 54	2 34 8	2 46 37	2 59 17	3 12 7	3 25 9	3 38 12	3 51 27	4 4 49	4 18 20	4 31 50	4 45 31	4 59 13	5 13 4
6	2 37 53	2 51 17	3 4 47	3 18 28	3 32 13	3 46 8	4 0 0	4 13 57	4 28 7	4 42 13	4 56 25	5 10 39	5 24 57	5 39 18	5 53 37
7	3 16 32	3 31 9	3 45 36	3 59 58	4 14 34	4 29 11	4 43 49	4 58 32	5 13 6	5 27 51	5 42 33	5 57 8	6 11 52	6 26 34	6 41 22
8	Not calculable.														
9	3 15 56	3 30 26	3 44 56	3 59 24	4 13 55	4 28 30	4 43 2	4 57 37	5 12 14	5 26 58	5 41 33	5 56 13	6 10 52	6 25 36	6 40 16
10	2 36 44	2 50 18	3 3 35	3 17 2	3 30 48	3 44 40	3 59 24	4 12 31	4 26 21	4 40 37	4 54 37	5 8 55	5 22 54	5 37 24	5 51 31
11	2 8 28	2 20 25	2 32 35	2 44 58	2 57 29	3 10 15	3 23 4	3 36 4	3 49 12	4 2 30	4 15 50	4 29 14	4 42 47	4 56 28	5 10 4
12	1 47 55	1 58 39	2 9 25	2 20 22	2 31 43	2 43 26	2 55 9	3 7 6	3 19 11	3 31 30	3 44 1	3 56 36	4 9 16	4 22 2	4 35 4
13	1 32 52	1 42 19	1 51 52	2 1 48	2 11 55	2 22 33	2 33 13	2 44 10	2 55 19	3 6 45	3 18 14	3 29 53	3 41 48	3 53 55	4 6 0
14	1 21 15	1 29 35	1 38 3	1 46 54	1 56 9	2 5 40	2 15 17	2 25 13	2 35 26	2 45 32	2 56 29	3 7 19	3 18 16	3 29 27	3 40 46
15	1 12 26	1 19 45	1 27 25	1 35 2	1 43 40	1 52 14	2 1 2	2 10 8	2 19 26	2 28 59	2 38 47	2 48 47	2 58 55	3 9 19	3 19 52
16	1 5 21	1 11 55	1 18 48	1 26 0	1 33 34	1 41 21	1 49 28	1 57 43	2 6 1	2 15 0	2 23 58	2 33 13	2 42 40	2 52 16	3 2 7
17	0 59 28	1 5 32	1 11 45	1 18 15	1 25 12	1 32 15	1 39 33	1 47 14	1 55 9	2 3 17	2 11 35	2 20 7	2 28 49	2 37 48	2 46 56
18	0 54 54	1 0 22	1 6 5	1 11 59	1 17 57	1 24 50	1 31 34	1 38 35	1 45 48	1 53 22	2 0 57	2 8 55	2 16 57	2 25 19	2 33 50
19	0 50 55	0 55 52	1 1 10	1 6 37	1 12 24	1 18 24	1 24 36	1 31 8	1 37 45	1 44 44	1 51 53	1 59 12	2 6 45	2 14 34	2 22 30
20	0 47 28	0 52 9	0 56 58	1 1 59	1 7 22	1 12 56	1 18 38	1 24 40	1 30 53	1 37 22	1 43 57	1 50 48	1 57 55	2 5 8	2 12 34
21	0 44 42	0 48 57	0 53 29	0 58 10	1 3 4	1 8 18	1 13 34	1 19 12	1 24 56	1 30 58	1 37 11	1 43 33	1 50 10	1 56 54	2 3 54
22	0 42 9	0 46 11	0 50 16	0 54 37	0 59 15	1 4 5	1 9 2	1 14 19	1 19 42	1 25 19	1 31 5	1 37 6	1 43 19	1 49 37	1 56 9
23	0 40 10	0 43 42	0 47 37	0 51 40	0 55 57	1 0 29	1 5 8	1 10 1	1 15 4	1 20 20	1 25 45	1 31 25	1 37 12	1 43 1	1 49 20

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 7 27	1 14 20	1 21 25	1 28 51	1 36 39	1 44 40	1 52 59	2 1 36	2 10 26	2 19 28	2 28 46	2 38 19	2 48 1	2 57 56	3 8 16
1	1 1 46	1 8 2	1 14 30	1 21 17	1 28 26	1 35 49	1 43 28	1 51 24	1 59 32	2 7 54	2 16 32	2 25 26	2 34 29	2 43 38	2 53 12
2	0 57 5	1 2 51	1 8 49	1 15 0	1 21 33	1 28 22	1 35 27	1 42 48	1 50 20	1 58 7	2 6 10	2 14 26	2 22 51	2 31 27	2 40 27
3	0 53 10	0 58 28	1 3 57	1 9 40	1 15 44	1 22 3	1 28 38	1 35 28	1 42 28	1 49 44	1 57 16	2 5 3	2 12 59	2 20 56	2 29 17
4	0 49 50	0 54 44	0 59 48	1 5 9	1 10 50	1 16 40	1 22 45	1 29 7	1 35 38	1 42 26	1 49 29	1 56 43	2 4 5	2 11 37	2 19 33
5	0 46 56	0 51 30	0 56 13	1 1 11	1 6 28	1 11 56	1 17 38	1 23 36	1 29 43	1 36 4	1 42 40	1 49 29	1 56 25	2 3 29	2 10 57
6	0 44 29	0 48 45	0 53 9	0 57 48	1 2 45	1 7 52	1 13 12	1 18 48	1 24 33	1 30 31	1 36 43	1 43 9	1 49 41	1 56 21	2 3 25
7	0 42 17	0 46 19	0 50 28	0 54 48	0 59 25	1 4 15	1 9 17	1 14 34	1 19 59	1 25 37	1 31 28	1 37 31	1 43 40	1 49 58	1 56 40
8	0 40 21	0 44 7	0 48 0	0 52 7	0 56 30	1 1 4	1 5 49	1 10 46	1 15 51	1 21 11	1 26 44	1 32 28	1 38 18	1 44 16	1 50 38
9	0 38 36	0 42 10	0 45 51	0 49 44	0 53 52	0 58 11	1 2 40	1 7 23	1 12 13	1 17 15	1 22 30	1 27 57	1 33 29	1 39 8	1 45 10
10	0 36 57	0 40 22	0 43 56	0 47 36	0 51 31	0 55 48	1 0 8	1 4 30	1 8 53	1 13 38	1 18 38	1 23 48	1 29 6	1 34 34	1 40 13
11	0 35 38	0 38 47	0 42 8	0 45 39	0 49 21	0 53 15	0 57 15	1 1 28	1 5 51	1 10 27	1 15 9	1 20 2	1 25 6	1 30 20	1 35 41
12	0 34 24	0 37 26	0 40 36	0 43 50	0 47 20	0 51 1	0 54 49	0 58 49	1 2 59	1 7 29	1 12 0	1 16 37	1 21 27	1 26 26	1 31 35
13	0 33 12	0 36 5	0 39 3	0 42 16	0 45 37	0 49 8	0 52 48	0 56 35	1 0 35	1 4 44	1 9 3	1 13 31	1 18 6	1 22 53	1 29 50
14	0 32 8	0 34 52	0 37 46	0 40 50	0 44 2	0 47 34	0 50 57	0 54 37	0 58 19	1 2 21	1 6 24	1 10 40	1 15 3	1 19 37	1 24 19
15	0 31 7	0 33 45	0 36 29	0 39 22	0 42 24	0 45 39	0 49 2	0 52 33	0 56 8	1 0 2	1 3 54	1 7 58	1 12 10	1 16 32	1 21 2
16	0 30 17	0 32 49	0 35 24	0 38 12	0 41 9	0 44 13	0 47 26	0 50 49	0 54 19	0 57 58	1 1 41	1 5 34	1 9 36	1 13 46	1 18 3
17	0 29 25	0 31 49	0 34 21	0 37 1	0 39 47	0 42 46	0 45 52	0 49 7	0 52 26	0 55 56	0 59 33	1 3 17	1 7 10	1 11 9	1 15 16
18	0 28 38	0 30 57	0 33 23	0 35 57	0 38 36	0 41 27	0 44 25	0 47 31	0 50 44	0 54 5	0 57 35	1 1 11	1 4 55	1 8 48	1 12 50
19	0 27 54	0 30 7	0 32 28	0 34 54	0 37 29	0 40 15	0 43 5	0 46 5	0 49 9	0 52 25	0 55 45	0 59 14	1 2 48	1 6 29	1 10 19
20	0 27 15	0 29 22	0 31 37	0 33 56	0 36 24	0 39 2	0 41 45	0 44 38	0 47 36	0 50 45	0 53 57	0 57 17	1 0 50	1 4 26	1 8 9
21	0 26 34	0 28 37	0 30 47	0 33 4	0 35 28	0 37 59	0 40 34	0 43 21	0 46 13	0 49 14	0 52 20	0 55 33	0 58 57	1 2 19	1 5 58
22	0 25 58	0 27 57	0 30 2	0 32 12	0 34 31	0 36 58	0 39 30	0 42 13	0 45 0	0 47 52	0 50 53	0 53 58	0 57 12	1 0 41	1 4 1
23	0 25 24	0 27 17	0 29 17	0 31 24	0 33 38	0 35 59	0 38 27	0 40 59	0 43 41	0 46 28	0 49 21	0 52 22	0 55 28	0 58 42	1 2 0

LATITUDE 8° NORTH OR SOUTH.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	3 18 22	3 28 50	3 39 28	3 50 16	4 1 12	4 12 18	4 23 32	4 34 54	4 46 22	4 57 59	5 9 40	5 21 31	5 33 34	5 45 29	5 57 36
1	3 2 45	3 12 40	3 22 40	3 32 50	3 43 11	3 53 41	4 4 17	4 15 1	4 25 56	4 37 0	4 48 10	4 59 29	5 11 0	5 22 22	5 33 59
2	2 49 24	2 58 42	3 8 6	3 17 40	3 27 26	3 37 21	3 47 27	3 57 40	4 8 1	4 18 31	4 29 10	4 39 55	4 50 55	5 1 46	5 12 53
3	2 37 42	2 46 28	2 55 22	3 4 25	3 13 38	3 22 59	3 32 35	3 42 17	3 52 5	4 2 4	4 12 12	4 22 26	4 32 57	4 43 19	4 53 57
4	2 27 28	2 35 44	2 44 9	2 52 42	3 1 26	3 10 17	3 19 22	3 28 32	3 37 52	3 47 22	3 57 2	4 6 48	4 16 49	4 26 41	4 36 52
5	2 18 26	2 26 15	2 34 12	2 42 16	2 50 33	2 58 56	3 7 33	3 16 15	3 25 8	3 34 11	3 43 23	3 52 41	4 2 17	4 11 43	4 21 27
6	2 10 29	2 17 52	2 25 23	2 33 0	2 40 52	2 48 50	2 57 1	3 5 17	3 13 44	3 22 21	3 31 7	3 39 59	3 49 9	3 58 9	4 7 29
7	2 3 22	2 10 23	2 17 32	2 24 46	2 32 14	2 39 47	2 47 35	2 55 27	3 3 31	3 11 44	3 20 7	3 28 35	3 37 21	3 45 57	3 54 53
8	1 56 58	2 3 37	2 10 25	2 17 17	2 24 24	2 31 36	2 39 2	2 46 31	2 54 13	3 2 4	3 10 4	3 18 9	3 26 32	3 34 45	3 43 19
9	1 51 41	1 57 31	2 4 0	2 10 32	2 17 19	2 24 10	2 31 16	2 38 25	2 45 45	2 53 14	3 0 54	3 8 38	3 16 40	3 24 32	3 32 45
10	1 46 1	1 52 0	1 58 8	2 4 24	2 10 50	2 17 24	2 24 9	2 31 2	2 38 2	2 45 11	2 52 29	2 59 55	3 7 29	3 15 12	3 23 2
11	1 41 13	1 46 55	1 52 45	1 58 46	2 4 54	2 11 10	2 17 36	2 24 13	2 30 55	2 37 45	2 44 46	2 51 53	2 59 10	3 6 32	3 14 3
12	1 36 51	1 42 18	1 47 53	1 53 38	1 59 30	2 5 30	2 11 39	2 17 59	2 24 24	2 30 58	2 37 41	2 44 32	2 51 30	2 58 35	3 5 48
13	1 33 3	1 38 16	1 43 38	1 49 7	1 54 45	2 0 32	2 6 29	2 12 29	2 18 41	2 25 1	2 31 48	2 38 2	2 44 44	2 51 34	2 58 33
14	1 29 10	1 34 9	1 39 17	1 44 33	1 49 56	1 55 29	2 1 8	2 6 56	2 12 52	2 18 56	2 25 7	2 31 26	2 37 51	2 44 25	2 51 5
15	1 25 47	1 30 34	1 35 28	1 40 31	1 45 41	1 51 0	1 56 27	2 2 1	2 7 43	2 13 33	2 19 29	2 25 33	2 31 44	2 38 4	2 44 29
16	1 22 29	1 27 4	1 31 50	1 36 43	1 41 41	1 46 40	1 51 54	1 57 17	2 2 46	2 8 23	2 14 7	2 19 58	2 25 55	2 31 59	2 38 13
17	1 19 36	1 24 3	1 28 36	1 33 17	1 38 5	1 42 58	1 48 1	1 53 11	1 58 27	2 3 50	2 9 21	2 14 59	2 20 44	2 26 33	2 32 33
18	1 16 56	1 21 9	1 25 31	1 30 0	1 34 37	1 39 21	1 44 12	1 49 10	1 54 16	1 59 28	2 4 47	2 10 10	2 15 43	2 21 23	2 27 9
19	1 14 27	1 18 29	1 22 34	1 26 58	1 31 25	1 35 58	1 40 31	1 45 27	1 50 22	1 55 22	2 0 30	2 5 44	2 11 5	2 16 32	2 22 6
20	1 11 55	1 15 51	1 19 55	1 24 5	1 28 21	1 32 45	1 37 16	1 41 54	1 46 39	1 51 29	1 56 26	2 1 31	2 6 40	2 11 55	2 17 20
21	1 9 42	1 13 37	1 17 32	1 21 32	1 25 40	1 29 47	1 34 7	1 38 37	1 43 11	1 47 52	1 52 39	1 57 31	2 2 30	2 7 35	2 12 47
22	1 7 33	1 11 12	1 14 59	1 18 52	1 22 52	1 26 58	1 31 9	1 35 32	1 39 54	1 44 24	1 49 2	1 53 44	1 58 34	2 3 29	2 8 28
23	1 5 26	1 9 2	1 12 40	1 16 26	1 20 19	1 24 18	1 28 23	1 32 32	1 36 47	1 41 7	1 45 31	1 50 5	1 54 46	1 59 34	2 4 26

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	6 9 50	6 22 4	6 34 31	6 46 57	6 59 31	7 12 8	7 24 48	7 37 34	7 50 24	8 3 15	8 16 12	8 29 11	8 42 15	8 55 22	9 8 34
1	5 45 43	5 57 28	6 9 26	6 21 21	6 33 24	6 45 38	6 57 55	7 10 15	7 22 38	7 35 5	7 47 37	8 0 13	8 12 53	8 25 38	8 38 28
2	5 24 7	5 35 23	5 46 52	5 58 24	6 10 3	6 21 47	6 33 32	6 45 28	6 57 26	7 9 27	7 21 33	7 33 46	7 46 2	7 58 22	8 10 46
3	5 4 42	5 15 30	5 26 31	5 37 35	5 48 46	6 0 4	6 11 23	6 22 53	6 34 24	6 46 1	6 57 43	7 9 32	7 21 24	7 33 22	7 45 23
4	4 47 10	4 57 30	5 8 3	5 18 41	5 29 25	5 40 18	5 51 11	6 2 16	6 13 21	6 24 34	6 35 51	6 47 17	6 58 45	7 10 18	7 21 54
5	4 31 17	4 41 11	4 51 18	5 1 31	5 11 49	5 22 17	5 32 44	5 43 24	5 54 4	6 4 54	6 15 47	6 26 49	6 37 52	6 49 4	7 0 19
6	4 16 54	4 26 23	4 36 5	4 45 53	4 55 46	5 5 51	5 15 54	5 26 10	5 36 26	5 46 54	5 57 25	6 8 5	6 18 45	6 29 35	6 40 27
7	4 3 53	4 12 59	4 22 17	4 31 42	4 41 11	4 50 52	5 0 30	5 10 24	5 20 18	5 30 22	5 40 28	5 50 45	6 1 2	6 11 29	6 21 58
8	3 51 56	4 0 40	4 9 36	4 18 18	4 27 4	4 36 44	4 46 20	4 55 51	5 5 22	5 15 5	5 24 50	5 34 45	5 44 40	5 54 47	6 4 55
9	3 41 0	3 49 23	3 57 57	4 6 27	4 15 0	4 24 10	4 33 16	4 42 26	4 51 36	5 0 58	5 10 22	5 19 57	5 29 31	5 39 37	5 49 44
10	3 30 59	3 39 4	3 47 16	3 55 35	4 4 0	4 12 33	4 21 13	4 30 0	4 38 53	4 47 52	4 56 58	5 6 10	5 15 28	5 24 52	5 34 2
11	3 21 40	3 29 27	3 37 20	3 45 22	3 53 27	4 1 41	4 10 2	4 18 30	4 27 3	4 35 43	4 44 30	4 53 24	5 2 22	5 11 24	5 20 35
12	3 13 5	3 20 36	3 28 10	3 35 52	3 43 41	3 51 38	3 59 40	4 7 50	4 16 4	4 24 27	4 32 55	4 41 29	4 50 10	4 58 57	5 7 49
13	3 5 37	3 12 46	3 20 7	3 27 33	3 35 5	3 42 45	3 50 31	3 58 25	4 6 23	4 14 27	4 22 38	4 30 58	4 39 21	4 47 50	4 56 26
14	2 57 53	3 4 47	3 11 49	3 18 58	3 26 14	3 33 35	3 41 3	3 48 39	3 56 20	4 4 8	4 12 2	4 20 2	4 28 7	4 36 19	4 44 38
15	2 51 1	2 57 41	3 4 28	3 11 21	3 18 21	3 25 28	3 32 40	3 40 0	3 47 26	3 54 58	4 2 35	4 10 19	4 18 9	4 26 6	4 34 7
16	2 44 31	2 50 57	2 57 40	3 4 18	3 11 1	3 17 51	3 24 49	3 31 55	3 39 6	3 46 21	3 53 41	4 1 9	4 8 46	4 16 26	4 24 9
17	2 38 48	2 44 50	2 51 9	2 57 33	3 4 5	3 10 41	3 17 24	3 24 14	3 31 11	3 38 14	3 45 23	3 52 35	3 59 54	4 7 18	4 14 48
18	2 33 2	2 39 1	2 45 6	2 51 17	2 57 34	3 3 57	3 10 26	3 17 1	3 23 42	3 30 32	3 37 28	3 44 29	3 51 34	3 58 44	4 6 2
19	2 27 44	2 33 34	2 39 27	2 45 28	2 51 32	2 57 43	3 3 59	3 10 27	3 16 59	3 23 33	3 30 9	3 36 57	3 43 45	3 50 43	3 57 44
20	2 22 47	2 28 21	2 34 2	2 39 49	2 45 42	2 51 41	2 57 46	3 3 57	3 10 14	3 16 38	3 23 3	3 29 38	3 36 19	3 43 4	3 49 54
21	2 18 6	2 23 30	2 28 59	2 34 34	2 40 17	2 46 5	2 51 59	2 57 58	3 4 3	3 10 14	3 16 30	3 22 51	3 29 18	3 35 50	3 42 25
22	2 13 37	2 18 49	2 24 9	2 29 35	2 35 6	2 40 42	2 46 24	2 52 11	2 58 3	3 4 2	3 10 4	3 16 18	3 22 31	3 28 47	3 35 16
23	2 9 24	2 14 26	2 19 35	2 24 49	2 30 11	2 35 35	2 41 6	2 46 44	2 52 28	2 58 26	3 4 18	3 10 16	3 16 14	3 22 22	3 28 33

LATITUDE 9° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 11 20	0 11 59	0 12 59	0 14 26	0 16 14	0 18 47	0 21 17	0 24 14	0 27 38	0 31 26	0 35 35	0 40 8	0 44 59	0 50 14	0 55 44
1	0 11 21	0 12 1	0 13 13	0 14 47	0 16 56	0 19 26	0 22 23	0 25 47	0 29 35	0 33 49	0 38 26	0 43 29	0 48 50	0 54 42	1 0 48
2	0 11 24	0 12 14	0 13 31	0 15 12	0 17 43	0 20 36	0 23 59	0 27 48	0 32 4	0 36 51	0 42 6	0 47 44	0 53 46	1 0 10	1 7 1
3	0 11 28	0 12 24	0 13 55	0 16 1	0 18 47	0 22 9	0 26 1	0 30 25	0 35 23	0 40 47	0 46 45	0 53 12	1 0 2	1 7 19	1 14 58
4	0 11 33	0 12 43	0 14 28	0 17 4	0 20 17	0 24 11	0 28 52	0 33 59	0 39 48	0 46 10	0 53 3	1 0 21	1 8 18	1 16 35	1 25 15
5	0 11 40	0 13 6	0 15 19	0 18 31	0 22 31	0 27 19	0 32 54	0 39 10	0 46 0	0 53 39	1 2 7	1 10 21	1 19 29	1 29 6	1 39 0
6	0 11 46	0 13 42	0 16 34	0 20 42	0 25 58	0 32 10	0 39 8	0 46 58	0 55 24	1 4 35	1 14 20	1 24 38	1 35 17	1 46 22	1 57 47
7	0 12 3	0 14 57	0 18 28	0 25 9	0 32 22	0 40 43	0 50 5	1 0 12	1 10 50	1 22 17	1 34 2	1 46 4	1 58 36	2 11 23	2 24 19
8	0 12 56	0 18 14	0 25 48	0 35 32	0 46 39	0 58 38	1 11 4	1 24 14	1 37 34	1 51 14	2 5 3	2 19 7	2 33 18	2 47 28	3 1 39
9	Not calculable.														
10	0 13 14	0 18 14	0 26 4	0 35 26	0 46 49	0 58 29	1 10 58	1 23 50	1 37 9	1 51 2	2 4 39	2 18 35	2 32 40	2 46 52	3 1 5
11	0 12 3	0 14 51	0 19 12	0 25 1	0 32 3	0 40 29	0 49 39	0 59 36	1 10 13	1 21 27	1 33 8	1 45 13	1 57 38	2 10 17	2 23 11
12	0 11 44	0 13 36	0 16 30	0 20 25	0 25 44	0 31 42	0 38 39	0 46 18	0 54 52	1 3 52	1 13 25	1 23 34	1 34 12	1 45 0	1 56 22
13	0 11 38	0 12 55	0 15 13	0 18 13	0 22 16	0 26 49	0 32 21	0 38 27	0 45 18	0 52 42	1 0 43	1 9 10	1 18 0	1 27 31	1 37 17
14	0 11 32	0 12 37	0 14 21	0 16 43	0 19 57	0 23 46	0 28 19	0 33 19	0 38 59	0 45 16	0 51 52	0 59 4	1 6 55	1 14 50	1 23 23
15	0 11 24	0 12 20	0 13 54	0 15 22	0 18 23	0 21 34	0 25 18	0 29 32	0 34 29	0 39 43	0 45 29	0 51 37	0 58 23	1 5 25	1 12 47
16	0 11 24	0 12 11	0 13 24	0 15 11	0 17 27	0 20 14	0 23 26	0 27 2	0 31 19	0 35 52	0 40 55	0 46 19	0 52 13	0 58 29	1 5 1
17	0 11 21	0 11 57	0 13 1	0 14 37	0 16 39	0 18 58	0 21 49	0 25 2	0 28 45	0 32 49	0 37 15	0 42 4	0 47 18	0 52 49	0 58 45
18	0 11 18	0 11 50	0 12 48	0 14 13	0 15 58	0 18 7	0 20 37	0 23 30	0 26 48	0 30 24	0 34 24	0 38 39	0 43 25	0 48 22	0 53 39
19	0 11 16	0 11 45	0 12 36	0 13 50	0 15 23	0 17 17	0 19 34	0 22 10	0 25 8	0 28 24	0 32 1	0 35 57	0 40 11	0 44 43	0 49 33
20	0 11 13	0 11 40	0 12 30	0 13 29	0 15 1	0 16 41	0 18 43	0 21 4	0 23 48	0 26 45	0 30 2	0 33 36	0 37 27	0 41 37	0 46 0
21	0 11 12	0 11 37	0 12 20	0 13 20	0 14 38	0 16 13	0 18 6	0 20 15	0 22 43	0 25 26	0 28 25	0 31 41	0 35 16	0 39 2	0 43 4
22	0 11 9	0 11 30	0 12 13	0 13 6	0 14 19	0 15 43	0 17 26	0 19 28	0 21 44	0 24 13	0 26 50	0 29 48	0 33 3	0 36 34	0 40 20
23	0 11 8	0 11 29	0 12 7	0 12 57	0 14 3	0 15 25	0 16 59	0 18 49	0 20 56	0 23 12	0 25 43	0 28 31	0 31 35	0 34 49	0 38 21

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 11 20	0 11 59	0 12 59	0 14 26	0 16 14	0 18 47	0 21 17	0 24 14	0 27 38	0 31 26	0 35 35	0 40 8	0 44 59	0 50 14	0 55 44
1	0 11 18	0 11 52	0 12 46	0 14 3	0 15 45	0 17 45	0 20 9	0 22 55	0 26 0	0 29 27	0 33 12	0 37 19	0 41 44	0 46 33	0 51 35
2	0 11 16	0 11 51	0 12 37	0 13 46	0 15 19	0 17 10	0 19 21	0 21 51	0 24 42	0 27 50	0 31 15	0 35 2	0 39 3	0 43 28	0 48 6
3	0 11 14	0 11 43	0 12 28	0 13 32	0 14 57	0 16 39	0 18 39	0 20 58	0 23 34	0 26 25	0 29 33	0 33 2	0 36 47	0 40 56	0 45 11
4	0 11 12	0 11 37	0 12 21	0 13 21	0 14 37	0 16 12	0 18 4	0 20 11	0 22 35	0 25 16	0 28 10	0 31 25	0 34 51	0 38 40	0 42 36
5	0 11 10	0 11 35	0 12 14	0 13 11	0 14 22	0 15 48	0 17 33	0 19 31	0 21 42	0 24 16	0 26 57	0 29 58	0 33 10	0 36 44	0 40 26
6	0 11 8	0 11 32	0 12 8	0 12 58	0 14 8	0 15 29	0 17 6	0 18 55	0 20 8	0 23 22	0 25 53	0 28 43	0 31 42	0 35 2	0 38 29
7	0 11 7	0 11 29	0 12 3	0 12 50	0 13 53	0 15 11	0 16 41	0 18 26	0 20 23	0 22 36	0 24 57	0 27 36	0 30 25	0 33 34	0 36 48
8	0 11 6	0 11 27	0 11 56	0 12 43	0 13 43	0 14 53	0 16 20	0 17 57	0 19 48	0 21 51	0 24 5	0 26 37	0 29 16	0 32 15	0 35 16
9	0 11 4	0 11 24	0 11 53	0 12 37	0 13 33	0 14 40	0 16 1	0 17 33	0 19 18	0 21 16	0 23 20	0 25 42	0 28 12	0 31 1	0 33 53
10	0 11 3	0 11 21	0 11 48	0 12 30	0 13 23	0 14 38	0 15 45	0 17 10	0 18 50	0 20 42	0 22 43	0 24 56	0 27 21	0 29 57	0 32 41
11	0 11 0	0 11 16	0 11 43	0 12 22	0 13 12	0 14 14	0 15 25	0 16 48	0 18 22	0 20 6	0 22 3	0 24 10	0 26 27	0 28 56	0 31 34
12	0 10 58	0 11 13	0 11 38	0 12 15	0 13 5	0 14 2	0 15 11	0 16 29	0 17 59	0 19 39	0 21 30	0 23 30	0 25 43	0 28 3	0 30 34
13	0 10 57	0 11 12	0 11 35	0 12 11	0 12 58	0 13 50	0 14 56	0 16 11	0 17 37	0 19 14	0 20 58	0 22 52	0 24 59	0 27 12	0 29 35
14	0 10 54	0 11 8	0 11 30	0 12 4	0 12 48	0 13 41	0 14 42	0 15 56	0 17 21	0 18 49	0 20 28	0 22 18	0 24 20	0 26 26	0 28 43
15	0 10 53	0 11 7	0 11 29	0 12 1	0 12 43	0 13 33	0 14 32	0 15 40	0 16 59	0 18 26	0 20 2	0 21 47	0 23 42	0 25 45	0 27 56
16	0 10 52	0 11 5	0 11 26	0 11 57	0 12 37	0 13 25	0 14 22	0 15 27	0 16 43	0 18 6	0 19 38	0 21 19	0 23 9	0 25 8	0 27 14
17	0 10 51	0 11 3	0 11 23	0 11 53	0 12 31	0 13 18	0 14 13	0 15 15	0 16 28	0 17 47	0 19 16	0 20 52	0 22 38	0 24 33	0 26 33
18	0 10 48	0 11 1	0 11 20	0 11 49	0 12 25	0 13 9	0 14 2	0 15 3	0 16 13	0 17 28	0 18 53	0 20 27	0 22 9	0 23 57	0 25 54
19	0 10 47	0 10 59	0 11 17	0 11 44	0 12 20	0 13 4	0 13 54	0 14 52	0 15 57	0 17 11	0 18 33	0 20 4	0 21 41	0 23 27	0 25 18
20	0 10 47	0 10 57	0 11 15	0 11 40	0 12 15	0 12 58	0 13 46	0 14 42	0 15 47	0 16 57	0 18 17	0 19 43	0 21 17	0 22 55	0 24 44
21	0 10 45	0 10 55	0 11 12	0 11 36	0 12 11	0 12 51	0 13 37	0 14 30	0 15 32	0 16 42	0 17 58	0 19 20	0 20 50	0 22 27	0 24 12
22	0 10 43	0 10 53	0 11 10	0 11 34	0 12 7	0 12 45	0 13 30	0 14 21	0 15 22	0 16 28	0 17 41	0 19 1	0 20 28	0 22 3	0 23 43
23	0 10 41	0 10 50	0 11 7	0 11 30	0 12 1	0 12 38	0 13 21	0 14 14	0 15 9	0 16 13	0 17 23	0 18 39	0 20 5	0 21 35	0 23 12

LATITUDE 9° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 1 38	1 7 53	1 14 23	1 21 11	1 28 11	1 35 38	1 43 16	1 51 11	1 59 18	2 7 41	2 16 18	2 25 8	2 34 10	2 43 26	2 52 51
1	1 7 17	1 14 6	1 21 15	1 28 42	1 36 27	1 44 28	1 52 44	2 1 19	2 10 8	2 19 9	2 28 27	2 37 57	2 47 39	2 57 33	3 7 39
2	1 14 14	1 21 47	1 29 41	1 37 51	1 46 23	1 55 9	2 4 12	2 13 29	2 23 6	2 32 50	2 42 55	2 53 5	3 3 33	3 14 9	3 24 59
3	1 23 2	1 31 27	1 40 12	1 49 15	1 58 39	2 8 18	2 18 12	2 28 22	2 38 47	2 49 24	3 1 14	3 11 15	3 22 27	3 33 50	3 45 21
4	1 34 19	1 43 50	1 53 34	2 3 40	2 14 2	2 24 44	2 35 29	2 46 36	2 57 55	3 9 28	3 21 4	3 32 57	3 45 0	3 57 14	4 9 30
5	1 49 19	2 0 5	2 10 54	2 22 11	2 33 37	2 45 20	2 57 10	3 9 16	3 21 33	3 34 5	3 46 35	3 59 18	4 12 9	4 25 7	4 38 8
6	2 9 25	2 21 33	2 33 44	2 45 7	2 58 49	3 11 35	3 24 32	3 37 40	3 50 52	4 4 55	4 17 35	4 31 4	4 44 47	4 58 25	5 11 59
7	2 37 27	2 50 53	3 4 19	3 17 56	3 31 38	3 45 33	3 59 23	4 13 22	4 27 19	4 41 30	4 55 38	5 9 51	5 24 8	5 38 26	5 52 43
8	3 15 56	3 30 26	3 44 56	3 59 24	4 13 55	4 28 30	4 43 2	4 57 37	5 12 14	5 26 58	5 41 33	5 56 13	6 10 52	6 25 36	6 40 16
9	Not calculable.														
10	3 15 21	3 29 48	3 44 11	3 58 37	4 13 7	4 27 42	4 42 8	4 56 44	5 11 18	5 25 59	5 40 33	5 55 8	6 9 45	6 24 30	6 39 4
11	2 36 13	2 49 29	3 2 56	3 16 26	3 30 7	3 43 46	3 57 37	4 11 27	4 25 27	4 39 28	4 53 35	5 7 39	5 21 48	5 36 1	5 50 16
12	2 7 56	2 19 47	2 31 48	2 44 6	2 56 42	3 9 25	3 22 4	3 35 2	3 48 10	4 1 29	4 14 41	4 28 2	4 41 35	4 55 8	5 8 45
13	1 47 22	1 57 53	2 8 46	2 19 42	2 30 56	2 42 39	2 54 20	3 6 9	3 18 14	3 30 35	3 42 55	3 55 27	4 8 7	4 20 54	4 33 45
14	1 32 15	1 41 36	1 51 2	2 0 58	2 11 8	2 21 29	2 32 5	2 43 1	2 54 3	3 5 26	3 16 52	3 28 30	3 40 18	3 52 20	4 4 20
15	1 20 37	1 28 48	1 37 25	1 46 12	1 55 20	2 4 47	2 14 21	2 24 21	2 34 26	2 44 46	2 55 25	3 6 7	3 17 0	3 28 11	3 39 28
16	1 11 54	1 19 18	1 26 51	1 34 49	1 42 59	1 51 40	2 0 21	2 9 22	2 18 36	2 28 3	2 37 49	2 47 45	2 57 52	3 8 15	3 18 39
17	1 4 57	1 11 33	1 18 20	1 25 33	1 32 54	1 40 41	1 48 43	1 56 54	2 5 26	2 14 8	2 23 7	2 32 16	2 41 36	2 51 14	3 0 57
18	0 59 14	1 5 11	1 11 27	1 17 51	1 24 40	1 31 43	1 39 6	1 46 37	1 54 26	2 2 27	2 10 44	2 19 9	2 29 49	2 36 44	2 45 46
19	0 54 43	1 0 7	1 5 53	1 11 48	1 18 1	1 24 35	1 31 16	1 38 17	1 45 27	1 52 58	2 0 36	2 8 28	2 16 31	2 24 49	2 33 18
20	0 50 41	0 55 42	1 0 56	1 6 22	1 12 7	1 18 6	1 24 17	1 30 45	1 37 24	1 44 20	1 51 24	1 58 42	2 6 14	2 13 56	2 21 53
21	0 47 23	0 51 58	0 56 50	1 1 51	1 7 8	1 12 41	1 18 23	1 24 23	1 30 32	1 36 57	1 43 35	1 50 21	1 57 23	2 4 33	2 11 57
22	0 44 16	0 48 34	0 52 59	0 57 37	1 2 33	1 7 41	1 12 53	1 18 29	1 24 13	1 30 10	1 36 21	1 42 42	1 49 15	1 55 58	2 2 55
23	0 42 2	0 45 55	0 50 2	0 54 21	0 58 55	1 3 43	1 8 40	1 13 49	1 19 12	1 24 47	1 30 32	1 36 30	1 42 38	1 48 56	1 55 26

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 1 38	1 7 53	1 14 23	1 21 11	1 28 11	1 35 38	1 43 16	1 51 11	1 59 18	2 7 41	2 16 18	2 25 8	2 34 10	2 43 26	2 52 51
1	0 57 0	1 2 42	1 8 38	1 14 56	1 21 26	1 28 15	1 35 15	1 42 35	1 50 7	1 57 55	2 5 56	2 14 10	2 22 36	2 31 17	2 40 6
2	0 53 6	0 58 21	1 3 50	1 9 39	1 15 40	1 22 0	1 28 30	1 35 18	1 42 17	1 49 34	1 57 3	2 4 45	2 12 38	2 20 46	2 29 2
3	0 49 47	0 54 39	0 59 44	1 5 9	1 10 45	1 16 37	1 22 39	1 29 0	1 35 32	1 42 20	1 49 20	1 56 33	2 3 56	2 11 35	2 19 22
4	0 46 53	0 51 26	0 56 12	1 1 15	1 6 28	1 11 57	1 17 35	1 23 32	1 29 39	1 36 2	1 42 37	1 49 24	1 56 21	2 3 33	2 10 53
5	0 44 28	0 48 41	0 53 7	0 57 50	1 2 42	1 7 51	1 13 9	1 18 39	1 24 19	1 30 23	1 36 38	1 43 3	1 49 37	1 56 25	2 3 21
6	0 42 16	0 46 14	0 50 25	0 54 51	0 59 25	1 4 16	1 9 15	1 14 29	1 19 53	1 25 33	1 31 23	1 37 25	1 43 36	1 50 2	1 56 35
7	0 40 22	0 44 5	0 48 1	0 52 12	0 56 30	1 1 6	1 5 50	1 10 45	1 15 49	1 21 10	1 26 41	1 32 26	1 38 19	1 44 25	1 50 37
8	0 38 36	0 42 7	0 45 51	0 49 48	0 53 52	0 58 12	1 2 40	1 7 22	1 12 13	1 17 17	1 22 30	1 27 56	1 33 29	1 39 17	1 45 10
9	0 37 4	0 40 24	0 43 56	0 47 40	0 51 30	0 54 37	0 59 52	1 4 18	1 8 53	1 13 41	1 18 38	1 23 49	1 29 7	1 34 38	1 40 14
10	0 35 36	0 38 48	0 42 11	0 45 40	0 49 23	0 53 24	0 57 33	1 1 44	1 5 59	1 10 24	1 15 10	1 20 5	1 25 9	1 30 22	1 35 46
11	0 34 24	0 37 23	0 40 34	0 43 54	0 47 29	0 51 6	0 54 58	0 58 59	1 3 10	1 7 31	1 12 2	1 16 42	1 21 32	1 26 31	1 31 39
12	0 33 15	0 36 8	0 39 10	0 42 17	0 45 37	0 49 8	0 52 47	0 56 36	1 0 35	1 4 51	1 9 21	1 13 38	1 18 12	1 22 59	1 27 54
13	0 32 11	0 34 56	0 37 46	0 40 50	0 44 2	0 47 25	0 50 56	0 54 33	0 58 23	1 2 21	1 6 29	1 10 45	1 15 8	1 19 43	1 24 28
14	0 31 11	0 33 48	0 36 35	0 39 30	0 42 34	0 46 0	0 49 11	0 52 41	0 56 16	1 0 6	1 4 1	1 8 7	1 12 19	1 16 42	1 21 13
15	0 30 16	0 32 48	0 35 25	0 38 12	0 41 5	0 44 13	0 47 28	0 50 50	0 54 18	0 58 0	1 1 44	1 5 39	1 9 42	1 13 53	1 18 13
16	0 29 28	0 31 53	0 34 25	0 37 6	0 39 52	0 42 52	0 46 0	0 49 14	0 52 34	0 56 6	0 59 43	1 3 28	1 7 22	1 11 23	1 15 33
17	0 28 42	0 31 0	0 33 26	0 36 1	0 38 41	0 41 33	0 44 32	0 47 39	0 50 51	0 54 14	0 57 43	1 1 19	1 5 4	1 8 55	1 12 54
18	0 27 57	0 30 11	0 32 32	0 35 0	0 37 34	0 40 20	0 43 11	0 46 11	0 49 16	0 52 31	0 55 53	0 59 21	1 2 57	1 6 43	1 10 35
19	0 27 17	0 29 25	0 31 41	0 34 2	0 36 32	0 39 12	0 41 56	0 44 50	0 47 48	0 50 57	0 54 10	0 57 32	1 0 59	1 4 33	1 8 16
20	0 26 40	0 28 43	0 30 54	0 33 9	0 35 33	0 38 5	0 40 43	0 43 30	0 46 22	0 49 24	0 52 31	0 55 44	0 59 9	1 2 37	1 6 14
21	0 26 2	0 28 1	0 30 7	0 32 19	0 34 39	0 37 5	0 39 36	0 42 17	0 45 4	0 47 59	0 50 59	0 54 6	0 57 23	1 0 37	1 4 11
22	0 25 28	0 27 24	0 29 25	0 31 31	0 33 46	0 36 8	0 38 35	0 41 12	0 43 54	0 46 40	0 49 36	0 52 36	0 55 44	0 59 8	1 2 21
23	0 24 55	0 26 46	0 28 42	0 30 45	0 32 55	0 35 11	0 37 36	0 40 3	0 42 40	0 45 22	0 48 11	0 51 6	0 54 7	0 57 15	1 0 28

LATITUDE 9° NORTH OR SOUTH.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	3 2 29	3 12 18	3 22 19	3 32 27	3 42 45	3 53 15	4 3 49	4 14 36	4 25 29	4 36 31	4 47 40	4 58 55	5 10 18	5 21 45	5 33 23
1	2 49 4	2 58 23	3 7 49	3 17 21	3 27 3	3 36 57	3 46 59	3 57 14	4 7 34	4 18 3	4 28 45	4 29 33	4 50 26	5 1 22	5 12 26
2	2 37 27	2 46 12	2 55 6	3 4 6	3 13 17	3 22 39	3 32 9	3 41 52	3 51 42	4 1 41	4 11 47	4 21 59	4 32 24	4 42 51	4 53 31
3	2 27 17	2 35 33	2 43 58	2 52 28	3 1 10	3 10 2	3 19 2	3 28 15	3 37 36	3 47 5	3 56 44	4 6 28	4 16 25	4 26 23	4 36 35
4	2 18 20	2 26 8	2 34 6	2 42 8	2 50 23	2 58 48	3 7 21	3 16 7	3 24 59	3 33 59	3 43 12	3 52 29	4 1 59	4 11 30	4 21 17
5	2 10 22	2 17 44	2 25 17	2 32 54	2 40 43	2 48 42	2 56 50	3 5 10	3 13 38	3 22 14	3 31 1	3 39 51	3 48 56	3 58 1	4 7 22
6	2 3 16	2 10 18	2 17 26	2 24 38	2 32 5	2 39 41	2 47 26	2 55 22	3 3 25	3 11 36	3 20 0	3 28 26	3 37 8	3 45 49	3 54 48
7	1 56 57	2 3 37	2 10 25	2 17 17	2 24 16	2 31 33	2 38 56	2 46 30	2 54 12	3 2 1	3 10 3	3 18 7	3 26 25	3 34 42	3 43 19
8	1 51 11	1 57 31	2 4 0	2 10 32	2 17 12	2 24 10	2 31 12	2 38 25	2 45 46	2 53 14	3 0 55	3 8 38	3 16 36	3 24 32	3 32 48
9	1 45 58	1 52 0	1 58 12	2 4 26	2 10 47	2 17 25	2 24 9	2 31 4	2 38 6	2 45 14	2 52 35	2 59 58	3 7 37	3 15 14	3 23 10
10	1 41 18	1 47 1	1 52 53	1 58 58	2 5 2	2 11 20	2 17 47	2 24 23	2 31 5	2 37 55	2 44 55	2 52 2	2 59 15	3 6 37	3 14 11
11	1 36 55	1 42 23	1 47 57	1 53 43	1 59 35	2 5 36	2 11 47	2 18 5	2 24 31	2 31 6	2 37 48	2 44 40	2 51 38	2 58 43	3 5 56
12	1 32 56	1 38 9	1 43 33	1 49 3	1 54 41	2 0 27	2 6 22	2 12 24	2 18 34	2 24 53	2 31 20	2 37 55	2 44 37	2 51 27	2 58 24
13	1 29 25	1 34 25	1 39 34	1 44 50	1 50 14	1 55 48	2 1 38	2 7 19	2 13 16	2 19 21	2 25 33	2 31 52	2 38 19	2 45 53	2 51 19
14	1 25 52	1 30 40	1 35 36	1 40 39	1 45 50	1 51 10	1 56 37	2 2 11	2 7 54	2 13 44	2 19 41	2 25 47	2 31 58	2 38 18	2 44 44
15	1 22 45	1 27 21	1 32 5	1 36 56	1 41 56	1 47 3	1 52 18	1 57 40	2 3 9	2 8 47	2 14 30	2 20 21	2 26 20	2 32 26	2 38 38
16	1 19 54	1 24 20	1 28 54	1 33 35	1 38 24	1 43 9	1 48 23	1 53 33	1 58 50	2 4 15	2 9 47	2 15 26	2 21 12	2 27 4	2 33 4
17	1 17 4	1 21 20	1 25 43	1 30 14	1 34 52	1 39 36	1 44 28	1 49 27	1 54 33	1 59 45	2 5 5	2 10 32	2 16 5	2 21 43	2 27 31
18	1 14 33	1 18 38	1 22 51	1 27 11	1 31 39	1 36 13	1 40 55	1 45 43	1 50 39	1 55 41	2 0 50	2 6 3	2 11 25	2 16 53	2 22 28
19	1 12 16	1 16 9	1 20 5	1 24 21	1 28 40	1 33 4	1 37 28	1 42 15	1 47 1	1 51 51	1 56 50	2 1 54	2 7 5	2 12 22	2 17 45
20	1 9 52	1 13 40	1 17 37	1 21 39	1 25 47	1 30 3	1 34 26	1 38 55	1 43 32	1 48 13	1 53 1	1 57 56	2 2 56	2 8 2	2 13 19
21	1 7 49	1 11 32	1 15 20	1 19 13	1 23 14	1 27 16	1 31 28	1 35 49	1 40 15	1 44 48	1 49 26	1 54 10	1 59 1	2 3 57	2 9 0
22	1 5 47	1 9 19	1 12 59	1 16 45	1 20 38	1 24 37	1 28 41	1 32 56	1 37 10	1 41 33	1 46 3	1 50 37	1 55 18	2 0 5	2 4 56
23	1 3 48	1 7 16	1 10 48	1 14 27	1 18 13	1 22 5	1 26 3	1 30 5	1 34 13	1 38 26	1 42 44	1 47 11	1 51 44	1 56 23	2 1 7

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	5 45 5	5 56 51	6 8 45	6 20 44	6 32 46	6 44 56	6 57 10	7 9 28	7 21 50	7 34 18	7 46 48	7 59 23	8 12 1	8 24 44	8 37 30
1	5 23 33	5 34 51	5 46 17	5 57 54	6 9 23	6 21 6	6 32 52	6 44 45	6 56 41	7 8 46	7 20 52	7 33 3	7 45 16	7 57 37	8 10 1
2	5 4 12	5 15 1	5 25 58	5 37 9	5 48 11	5 59 29	6 10 50	6 22 17	6 33 46	6 45 25	6 57 4	7 8 52	7 20 42	7 32 39	7 44 39
3	4 46 48	4 57 10	5 7 40	5 18 25	5 29 1	5 40 52	5 50 45	6 1 48	6 12 53	6 24 13	6 35 33	6 46 55	6 58 19	7 9 50	7 21 24
4	4 31 4	4 40 59	4 51 2	5 1 22	5 11 32	5 22 58	5 32 26	5 43 5	5 53 45	6 4 36	6 15 27	6 26 28	6 37 31	6 48 41	6 59 54
5	4 16 42	4 26 14	4 35 54	4 45 50	4 55 35	5 6 36	5 15 38	5 25 55	5 36 13	5 46 41	5 57 8	6 7 46	6 18 26	6 29 15	6 40 6
6	4 3 45	4 12 53	4 22 8	4 31 39	4 40 59	4 51 40	5 0 21	5 10 23	5 20 6	5 30 12	5 40 16	5 50 32	6 0 50	6 11 17	6 21 45
7	3 51 53	4 0 39	4 9 32	4 18 42	4 27 40	4 37 58	4 46 16	4 55 58	5 5 20	5 14 53	5 24 44	5 34 39	5 44 35	5 54 42	6 4 49
8	3 41 0	3 49 25	3 57 57	4 6 35	4 15 0	4 25 8	4 33 16	4 42 36	4 51 36	5 0 50	5 10 22	5 19 56	5 29 31	5 39 37	5 49 44
9	3 31 2	3 39 24	3 47 52	3 56 5	4 4 4	4 13 41	4 21 17	4 30 18	4 38 59	4 47 49	4 56 56	5 6 14	5 15 33	5 25 0	5 34 27
10	3 21 51	3 29 37	3 37 30	3 45 31	3 53 37	4 1 52	4 10 14	4 18 41	4 27 14	4 35 55	4 44 42	4 53 35	5 2 34	5 11 39	5 20 49
11	3 13 18	3 20 47	3 28 21	3 36 3	3 43 53	3 51 49	3 59 51	4 8 35	4 16 18	4 24 40	4 33 8	4 41 43	4 50 24	4 59 10	5 8 3
12	3 5 27	3 12 40	3 19 55	3 27 20	3 34 53	3 42 33	3 50 17	3 58 11	4 6 9	4 14 15	4 22 25	4 30 42	4 39 6	4 47 35	4 56 10
13	2 58 25	3 5 19	3 13 23	3 19 33	3 27 53	3 34 12	3 41 43	3 49 21	3 57 3	4 5 51	4 13 45	4 20 47	4 28 55	4 37 4	4 45 25
14	2 51 18	2 57 58	3 4 45	3 11 39	3 18 40	3 25 45	3 32 58	3 40 20	3 47 44	3 55 18	4 2 58	4 10 41	4 18 32	4 26 30	4 34 30
15	2 44 57	2 51 23	2 57 56	3 4 36	3 11 22	3 18 14	3 25 12	3 32 19	3 39 28	3 46 47	3 54 10	4 1 37	4 9 12	4 16 56	4 24 49
16	2 39 15	2 45 23	2 51 43	2 58 10	3 4 42	3 11 20	3 18 5	3 24 56	3 31 52	3 39 8	3 46 8	3 53 21	4 0 42	4 8 9	4 15 44
17	2 33 35	2 39 25	2 45 32	2 51 44	2 58 3	3 4 27	3 10 58	3 17 34	3 24 17	3 31 9	3 38 6	3 45 6	3 52 12	3 59 23	4 6 41
18	2 28 10	2 33 58	2 39 52	2 45 51	2 51 57	2 58 9	3 4 27	3 10 50	3 17 19	3 23 56	3 30 39	3 37 26	3 44 19	3 51 17	3 58 23
19	2 23 13	2 28 53	2 34 35	2 40 25	2 46 17	2 52 18	2 58 23	3 4 36	3 10 52	3 17 19	3 23 47	3 30 24	3 37 1	3 43 48	3 50 38
20	2 18 34	2 23 58	2 29 29	2 35 6	2 40 49	2 46 38	2 52 32	2 58 33	3 4 40	3 10 52	3 17 4	3 23 28	3 29 59	3 36 33	3 43 12
21	2 14 10	2 19 24	2 24 44	2 30 9	2 35 42	2 41 20	2 47 4	2 52 53	2 58 48	3 4 49	3 10 55	3 17 6	3 23 23	3 29 44	3 36 7
22	2 9 55	2 14 59	2 20 10	2 25 27	2 30 49	2 36 16	2 41 49	2 47 27	2 53 9	2 58 58	3 4 52	3 10 55	3 17 0	3 23 6	3 29 22
23	2 5 57	2 10 52	2 15 52	2 20 58	2 26 10	2 31 26	2 36 48	2 42 17	2 47 52	2 53 38	2 59 20	3 5 10	3 11 1	3 17 0	3 23 1

LATITUDE 10° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 11 17	0 11 55	0 12 47	0 14 2	0 15 44	0 17 47	0 20 10	0 22 53	0 25 59	0 29 25	0 33 9	0 37 19	0 41 43	0 46 29	0 51 32
1	0 11 18	0 11 58	0 12 55	0 14 25	0 16 15	0 18 30	0 21 8	0 24 11	0 27 34	0 31 21	0 35 31	0 39 58	0 44 52	0 50 5	0 55 38
2	0 11 24	0 12 1	0 13 13	0 14 45	0 16 51	0 19 24	0 22 21	0 25 41	0 29 35	0 33 42	0 38 24	0 43 22	0 48 46	0 54 32	1 0 40
3	0 11 27	0 12 8	0 13 31	0 15 21	0 17 40	0 20 33	0 23 51	0 27 41	0 32 0	0 36 47	0 41 56	0 47 35	0 53 36	1 0 4	1 6 50
4	0 11 33	0 12 26	0 13 51	0 15 57	0 18 44	0 21 59	0 25 53	0 30 18	0 35 20	0 40 43	0 46 39	0 52 59	0 59 50	1 7 6	1 14 41
5	0 11 37	0 12 39	0 14 28	0 16 54	0 20 16	0 24 2	0 28 41	0 33 46	0 39 43	0 45 58	0 52 47	1 0 11	1 8 1	1 16 21	1 24 54
6	0 11 42	0 12 57	0 15 18	0 18 26	0 22 27	0 27 12	0 32 43	0 38 52	0 45 55	0 53 25	1 1 37	1 10 5	1 19 18	1 28 51	1 38 39
7	0 11 58	0 13 42	0 16 38	0 20 46	0 25 56	0 32 2	0 39 1	0 46 44	0 55 19	1 4 29	1 14 10	1 24 20	1 35 11	1 46 4	1 57 20
8	0 12 21	0 14 46	0 19 13	0 24 53	0 32 13	0 40 39	0 49 48	0 59 42	1 10 37	1 21 41	1 33 35	1 45 38	1 58 9	2 10 45	2 23 43
9	0 13 14	0 18 14	0 26 4	0 35 26	0 46 49	0 58 29	1 10 58	1 23 50	1 37 9	1 51 2	2 4 39	2 18 35	2 32 40	2 46 52	3 1 5
10	Not calculable.														
11	0 12 56	0 18 12	0 25 54	0 35 14	0 46 14	0 58 14	1 10 40	1 23 38	1 36 48	1 50 29	2 4 12	2 18 8	2 32 3	2 46 14	3 0 26
12	0 12 13	0 14 44	0 18 54	0 24 42	0 32 13	0 40 13	0 49 23	0 59 13	1 10 6	1 20 55	1 32 43	1 44 44	1 57 8	2 9 46	2 22 35
13	0 11 44	0 13 36	0 16 25	0 20 25	0 25 36	0 31 36	0 38 30	0 46 1	0 54 33	1 3 42	1 12 56	1 22 58	1 33 44	1 44 37	1 55 44
14	0 11 38	0 12 52	0 14 59	0 18 11	0 22 11	0 26 35	0 32 11	0 38 16	0 45 13	0 52 30	1 0 21	1 8 45	1 17 42	1 26 56	1 36 44
15	0 11 28	0 12 33	0 14 20	0 16 47	0 19 57	0 22 45	0 28 10	0 33 13	0 38 46	0 44 57	0 51 35	0 58 46	1 6 21	1 14 25	1 22 51
16	0 11 28	0 12 20	0 13 44	0 15 47	0 18 32	0 21 39	0 25 22	0 29 35	0 34 24	0 39 41	0 45 24	0 51 12	0 58 14	1 5 9	1 12 35
17	0 11 24	0 12 9	0 13 22	0 15 9	0 17 27	0 20 8	0 23 22	0 26 55	0 31 8	0 35 41	0 40 40	0 46 4	0 51 53	0 58 7	1 4 38
18	0 11 20	0 11 56	0 13 1	0 14 36	0 16 36	0 18 56	0 21 45	0 24 57	0 28 40	0 32 38	0 37 2	0 41 49	0 47 2	0 52 31	0 58 23
19	0 11 18	0 11 50	0 12 48	0 14 10	0 15 53	0 18 6	0 20 33	0 23 24	0 26 38	0 30 11	0 34 10	0 38 28	0 43 4	0 48 2	0 53 18
20	0 11 17	0 11 45	0 12 37	0 13 47	0 15 25	0 17 19	0 19 34	0 22 6	0 25 5	0 28 15	0 31 48	0 35 41	0 39 43	0 44 21	0 49 6
21	0 11 15	0 11 41	0 12 29	0 13 33	0 14 58	0 16 42	0 18 44	0 21 4	0 23 42	0 26 40	0 29 51	0 33 23	0 37 17	0 41 18	0 45 39
22	0 11 11	0 11 35	0 12 19	0 13 19	0 14 37	0 16 12	0 17 59	0 20 10	0 22 36	0 25 16	0 28 14	0 31 26	0 34 54	0 38 42	0 42 41
23	0 11 10	0 11 33	0 12 13	0 13 8	0 14 19	0 15 46	0 17 28	0 19 25	0 21 39	0 24 7	0 26 48	0 29 46	0 33 4	0 36 30	0 40 10

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 11 17	0 11 55	0 12 47	0 14 2	0 15 44	0 17 47	0 20 11	0 22 53	0 25 59	0 29 25	0 33 9	0 37 19	0 41 43	0 46 29	0 51 32
1	0 11 15	0 11 45	0 12 36	0 13 46	0 15 19	0 17 5	0 19 26	0 21 48	0 24 37	0 27 46	0 31 12	0 34 57	0 39 3	0 43 25	0 48 3
2	0 11 15	0 11 41	0 12 28	0 13 33	0 14 56	0 16 37	0 18 39	0 20 56	0 23 32	0 26 26	0 29 36	0 33 3	0 36 49	0 40 51	0 45 9
3	0 11 14	0 11 38	0 12 21	0 13 20	0 14 37	0 16 12	0 18 1	0 20 10	0 22 35	0 25 15	0 28 11	0 31 23	0 34 52	0 38 37	0 42 39
4	0 11 13	0 11 35	0 12 15	0 13 9	0 14 22	0 15 49	0 17 31	0 19 29	0 21 46	0 24 15	0 26 58	0 29 57	0 33 12	0 36 42	0 40 27
5	0 11 11	0 11 32	0 12 9	0 12 58	0 14 8	0 15 29	0 17 5	0 18 53	0 21 3	0 23 22	0 25 54	0 28 41	0 31 45	0 35 2	0 38 31
6	0 11 10	0 11 29	0 12 3	0 12 51	0 13 56	0 15 12	0 16 42	0 18 22	0 20 24	0 22 35	0 24 58	0 27 35	0 30 28	0 33 33	0 36 50
7	0 11 8	0 11 26	0 11 58	0 12 44	0 13 44	0 14 56	0 16 21	0 17 55	0 19 49	0 21 53	0 24 8	0 26 36	0 29 19	0 32 13	0 35 19
8	0 11 6	0 11 24	0 11 53	0 12 37	0 13 33	0 14 41	0 16 2	0 17 31	0 19 18	0 21 16	0 23 23	0 25 43	0 28 17	0 31 1	0 33 53
9	0 11 3	0 11 21	0 11 48	0 12 30	0 13 23	0 14 38	0 15 45	0 17 10	0 18 50	0 20 42	0 22 43	0 24 56	0 27 21	0 29 57	0 32 41
10	0 11 0	0 11 17	0 11 44	0 12 23	0 13 14	0 14 15	0 15 28	0 16 50	0 18 24	0 20 10	0 22 6	0 24 13	0 26 30	0 28 58	0 31 36
11	0 10 58	0 11 13	0 11 40	0 12 17	0 13 5	0 14 3	0 15 12	0 16 31	0 18 0	0 19 41	0 21 31	0 23 32	0 25 42	0 28 3	0 30 35
12	0 10 56	0 11 11	0 11 35	0 12 10	0 12 58	0 13 52	0 14 57	0 16 12	0 17 38	0 19 14	0 20 59	0 22 54	0 24 59	0 27 14	0 29 38
13	0 10 55	0 11 10	0 11 32	0 12 6	0 12 50	0 13 41	0 14 44	0 15 57	0 17 19	0 18 51	0 20 30	0 22 20	0 24 22	0 26 29	0 28 45
14	0 10 52	0 11 5	0 11 27	0 11 59	0 12 41	0 13 32	0 14 31	0 15 40	0 17 1	0 18 26	0 20 2	0 21 47	0 23 43	0 25 45	0 27 58
15	0 10 52	0 11 5	0 11 26	0 11 57	0 12 37	0 13 25	0 14 22	0 15 27	0 16 43	0 18 7	0 19 39	0 21 19	0 23 10	0 25 9	0 27 4
16	0 10 51	0 11 3	0 11 24	0 11 53	0 12 31	0 13 17	0 14 13	0 15 15	0 16 28	0 17 48	0 19 17	0 20 53	0 22 40	0 24 33	0 26 30
17	0 10 50	0 11 1	0 11 21	0 11 50	0 12 26	0 13 11	0 14 5	0 15 5	0 16 14	0 17 31	0 18 57	0 20 29	0 22 11	0 24 1	0 25 57
18	0 10 47	0 10 59	0 11 18	0 11 45	0 12 20	0 13 3	0 13 55	0 14 53	0 16 0	0 17 13	0 18 35	0 20 5	0 21 44	0 23 27	0 25 20
19	0 10 46	0 10 57	0 11 15	0 11 40	0 12 15	0 12 58	0 13 46	0 14 42	0 15 45	0 16 57	0 18 16	0 19 44	0 21 17	0 22 59	0 24 47
20	0 10 45	0 10 56	0 11 13	0 11 37	0 12 11	0 12 52	0 13 38	0 14 32	0 15 35	0 16 43	0 18 0	0 19 23	0 20 54	0 22 30	0 24 15
21	0 10 43	0 10 53	0 11 10	0 11 33	0 12 7	0 12 45	0 13 30	0 14 22	0 15 22	0 16 29	0 17 42	0 19 2	0 20 30	0 22 4	0 23 45
22	0 10 41	0 10 52	0 11 8	0 11 31	0 12 3	0 12 40	0 13 23	0 14 13	0 15 12	0 16 15	0 17 26	0 18 44	0 20 8	0 21 40	0 23 17
23	0 10 39	0 10 49	0 11 5	0 11 27	0 11 57	0 12 33	0 13 15	0 14 6	0 15 0	0 16 2	0 17 10	0 18 24	0 19 48	0 21 5	0 22 49

LATITUDE 10° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 56 54	1 2 35	1 8 32	1 14 44	1 21 17	1 28 4	1 35 5	1 42 22	1 49 54	1 57 39	2 5 39	2 13 52	2 22 18	2 30 56	2 39 44
1	1 1 31	1 7 42	1 14 14	1 20 57	1 28 0	1 35 27	1 42 58	1 50 50	1 58 59	2 7 23	2 15 56	2 24 44	2 33 39	2 43 1	2 52 27
2	1 7 7	1 13 54	1 21 0	1 28 29	1 36 11	1 44 12	1 52 26	2 0 57	2 9 45	2 18 46	2 28 2	2 37 31	2 47 11	2 57 8	3 7 8
3	1 13 56	1 21 46	1 29 28	1 37 19	1 46 0	1 54 46	2 3 50	2 12 58	2 22 38	2 32 22	2 42 25	2 52 30	3 2 58	3 13 17	3 24 25
4	1 22 41	1 31 12	1 39 54	1 48 52	1 58 13	2 7 52	2 17 43	2 26 53	2 38 15	2 48 33	2 59 40	3 10 39	3 21 44	3 33 10	3 44 39
5	1 33 57	1 43 24	1 53 9	2 3 11	2 13 33	2 24 11	2 34 58	2 45 58	2 57 17	3 8 53	3 20 24	3 32 10	3 44 14	3 56 23	4 8 42
6	1 48 54	1 59 31	2 10 26	2 21 38	2 33 2	2 44 47	2 56 37	3 8 38	3 20 53	3 33 17	3 45 50	3 58 26	4 11 17	4 24 14	4 37 14
7	2 9 1	2 21 4	2 33 21	2 45 42	2 58 16	3 10 59	3 23 57	3 36 59	3 50 12	4 3 32	4 16 52	4 30 19	4 43 54	4 57 35	5 11 21
8	2 36 44	2 50 18	3 3 35	3 17 2	3 30 48	3 44 40	3 59 24	4 12 31	4 26 21	4 40 37	4 54 37	5 8 55	5 22 54	5 37 24	5 51 31
9	3 15 21	3 29 48	3 44 11	3 58 37	4 13 7	4 27 42	4 42 8	4 56 44	5 11 18	5 25 59	5 40 33	5 55 8	6 9 45	6 24 30	6 39 4
10	Not calculable.														
11	3 14 44	3 28 56	3 43 25	3 57 48	4 12 14	4 26 43	4 41 11	4 55 45	5 10 13	5 24 48	5 39 22	5 53 56	6 8 31	6 23 7	6 37 43
12	2 35 32	2 48 46	3 2 13	3 15 35	3 29 3	3 42 46	3 56 43	4 10 27	4 24 18	4 38 20	4 52 0	5 6 25	5 20 31	5 34 45	5 48 54
13	2 7 14	2 19 2	2 31 2	2 43 21	2 55 48	3 8 32	3 21 13	3 34 6	3 47 6	4 0 17	4 13 35	4 26 50	4 40 15	4 53 47	5 7 26
14	1 46 49	1 57 15	2 8 3	2 18 53	2 30 11	2 42 34	2 53 20	3 5 11	3 17 14	3 29 25	3 41 44	3 54 16	4 6 47	4 19 34	4 32 27
15	1 31 43	1 40 52	1 49 22	2 0 10	2 10 18	2 20 39	2 31 13	2 42 4	2 53 7	3 4 17	3 15 45	3 27 19	3 38 4	3 50 57	4 3 0
16	1 20 20	1 28 28	1 36 57	1 45 40	1 54 45	2 4 8	2 13 28	2 23 38	2 33 38	2 43 59	2 54 26	3 5 8	3 15 56	3 26 59	3 38 18
17	1 11 30	1 18 45	1 26 19	1 34 14	1 42 22	1 50 53	1 59 32	2 8 34	2 17 40	2 27 14	2 36 46	2 46 41	2 56 43	3 6 58	3 17 24
18	1 4 31	1 11 6	1 17 46	1 24 55	1 32 18	1 40 3	1 47 55	1 56 10	2 4 33	2 13 17	2 22 4	2 31 13	2 40 29	2 50 2	2 59 41
19	0 58 51	1 4 43	1 10 57	1 17 21	1 24 1	1 31 9	1 38 20	1 45 51	1 53 35	2 1 38	2 9 45	2 18 10	2 26 43	2 35 31	2 44 33
20	0 54 10	0 59 32	1 5 12	1 11 4	1 17 11	1 23 35	1 30 16	1 37 11	1 44 17	1 51 41	1 59 14	2 7 0	2 14 58	2 23 9	2 31 37
21	0 50 16	0 55 11	1 0 23	1 5 44	1 11 24	1 17 17	1 23 25	1 29 48	1 36 22	1 43 11	1 50 14	1 57 25	2 4 52	2 12 29	2 20 17
22	0 46 54	0 51 28	0 56 13	1 1 9	1 6 24	1 11 51	1 17 30	1 23 25	1 29 31	1 35 48	1 42 24	1 49 6	1 56 0	2 3 8	2 10 30
23	0 44 5	0 48 19	0 52 39	0 57 15	1 2 6	1 7 10	1 12 26	1 17 52	1 23 35	1 29 30	1 35 35	1 41 51	1 48 21	1 54 59	2 1 50

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 56 54	1 2 35	1 8 32	1 14 44	1 21 17	1 28 4	1 35 5	1 42 22	1 49 54	1 57 39	2 5 39	2 13 52	2 22 18	2 30 56	2 39 44
1	0 52 59	0 58 15	1 3 46	1 9 28	1 15 29	1 21 44	1 28 18	1 35 2	1 42 4	1 49 18	1 56 49	2 4 24	2 12 15	2 20 20	2 28 44
2	0 49 41	0 54 34	0 59 40	1 5 0	1 10 35	1 16 23	1 23 29	1 28 47	1 35 21	1 42 7	1 49 9	1 56 17	2 3 39	2 11 18	2 19 10
3	0 46 50	0 51 23	0 56 8	1 1 8	1 6 20	1 11 46	1 17 27	1 23 21	1 29 31	1 35 53	1 42 28	1 49 13	1 56 8	2 3 18	2 10 40
4	0 44 23	0 48 37	0 53 3	0 57 44	1 2 36	1 7 42	1 13 1	1 18 34	1 24 21	1 30 19	1 36 30	1 42 53	1 49 27	1 56 13	2 3 10
5	0 42 14	0 46 12	0 50 22	0 54 46	0 59 22	1 4 11	1 9 12	1 14 24	1 19 48	1 25 23	1 31 11	1 37 15	1 43 30	1 49 54	1 56 28
6	0 40 19	0 44 3	0 48 0	0 52 7	0 56 27	1 1 5	1 5 50	1 10 47	1 15 49	1 21 6	1 26 37	1 32 22	1 38 17	1 44 22	1 50 37
7	0 38 36	0 42 7	0 45 52	0 49 45	0 53 51	0 58 18	1 2 48	1 7 29	1 12 11	1 17 12	1 22 27	1 27 54	1 33 30	1 39 16	1 45 13
8	0 36 59	0 40 22	0 43 56	0 47 36	0 51 31	0 55 48	1 0 8	1 4 30	1 8 53	1 13 38	1 18 38	1 23 48	1 29 6	1 34 34	1 40 13
9	0 35 36	0 38 48	0 42 11	0 45 40	0 49 23	0 53 24	0 57 33	1 1 44	1 5 59	1 10 24	1 15 10	1 20 5	1 25 9	1 30 22	1 35 46
10	0 34 23	0 37 24	0 40 36	0 43 55	0 47 27	0 51 13	0 55 9	0 59 10	1 3 16	1 7 29	1 12 2	1 16 43	1 21 33	1 26 32	1 31 41
11	0 33 16	0 36 7	0 39 10	0 42 21	0 45 42	0 49 13	0 52 54	0 56 45	1 0 43	1 4 52	1 9 12	1 13 40	1 18 17	1 23 3	1 27 58
12	0 32 12	0 34 56	0 37 51	0 40 53	0 44 4	0 47 26	0 50 58	0 54 37	0 58 26	1 2 26	1 6 27	1 10 50	1 15 14	1 19 48	1 24 31
13	0 31 14	0 33 52	0 36 36	0 39 31	0 42 35	0 45 50	0 49 12	0 52 42	0 56 22	1 0 10	1 4 8	1 8 13	1 12 35	1 16 48	1 21 21
14	0 30 19	0 32 49	0 35 29	0 38 16	0 41 12	0 44 32	0 47 31	0 50 51	0 54 23	0 58 2	1 1 49	1 5 46	1 9 48	1 14 1	1 18 22
15	0 29 29	0 31 55	0 34 26	0 37 8	0 39 52	0 42 54	0 46 0	0 49 14	0 52 36	0 56 8	0 59 45	1 3 32	1 7 27	1 11 28	1 15 39
16	0 28 40	0 31 4	0 33 30	0 36 6	0 38 45	0 41 39	0 44 38	0 47 45	0 50 59	0 54 23	0 57 52	1 1 30	1 5 17	1 9 9	1 13 11
17	0 28 2	0 30 15	0 32 35	0 35 5	0 37 40	0 40 25	0 43 17	0 46 17	0 49 23	0 52 40	0 56 1	0 59 30	1 3 8	1 6 52	1 10 44
18	0 27 19	0 29 29	0 31 44	0 34 7	0 36 36	0 39 17	0 42 1	0 44 55	0 47 54	0 51 3	0 54 17	0 57 39	1 1 7	1 4 46	1 8 28
19	0 26 43	0 28 46	0 30 57	0 33 14	0 35 39	0 38 13	0 40 51	0 43 39	0 46 32	0 49 34	0 52 41	0 55 56	0 59 17	1 2 45	1 6 22
20	0 26 7	0 28 6	0 30 13	0 32 25	0 34 45	0 37 12	0 39 46	0 42 27	0 45 14	0 48 10	0 51 11	0 54 18	0 57 34	1 0 54	1 4 25
21	0 25 32	0 27 27	0 29 29	0 31 36	0 33 53	0 36 14	0 38 43	0 41 18	0 44 0	0 46 49	0 49 44	0 52 45	0 55 54	0 59 1	1 2 30
22	0 25 0	0 26 53	0 28 50	0 30 53	0 33 4	0 35 21	0 37 44	0 40 14	0 42 51	0 45 32	0 48 23	0 51 18	0 54 20	0 57 39	1 0 46
23	0 24 28	0 26 17	0 28 9	0 30 9	0 32 15	0 34 27	0 36 47	0 39 11	0 41 43	0 44 20	0 47 5	0 49 55	0 52 51	0 55 53	0 59 1

LATITUDE 10° NORTH OR SOUTH.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	2 48 45	2 57 59	3 7 22	3 16 55	3 26 37	3 36 30	3 46 31	3 56 43	4 7 3	4 17 30	4 28 5	4 38 48	4 49 37	5 0 35	5 11 40
1	2 37 11	2 45 51	2 54 42	3 3 44	3 12 56	3 22 16	3 31 47	3 41 27	3 51 14	4 1 10	4 11 15	4 21 29	4 31 49	4 42 18	4 52 54
2	2 27 8	2 35 17	2 44 39	2 52 12	3 0 54	3 9 44	3 18 45	3 27 55	3 37 43	3 47 40	3 56 46	4 6 0	4 15 53	4 25 55	4 36 3
3	2 18 11	2 25 53	2 33 47	2 41 52	2 50 5	2 58 29	3 7 2	3 15 45	3 24 38	3 33 39	3 42 49	3 52 7	4 1 32	4 11 5	4 20 47
4	2 10 17	2 17 34	2 25 3	2 32 43	2 40 31	2 48 30	2 56 37	3 4 54	3 13 23	3 21 59	3 30 43	3 39 34	3 48 38	3 57 50	4 7 4
5	2 3 13	2 10 8	2 17 13	2 24 29	2 31 55	2 39 31	2 47 16	2 55 10	3 3 13	3 11 25	3 19 45	3 28 14	3 36 50	3 45 34	3 54 28
6	1 57 2	2 3 38	2 10 23	2 17 18	2 24 23	2 31 38	2 39 2	2 46 36	2 54 1	3 1 35	3 9 41	3 17 55	3 26 5	3 34 32	3 43 4
7	1 51 19	1 57 36	2 4 2	2 10 37	2 17 22	2 24 16	2 31 20	2 38 34	2 45 18	2 52 11	3 0 19	3 8 35	3 16 25	3 24 32	3 32 43
8	1 46 1	1 52 0	1 58 8	2 4 24	2 10 50	2 17 24	2 24 9	2 31 2	2 38 2	2 45 11	2 52 29	2 59 55	3 7 29	3 15 12	3 23 2
9	1 41 18	1 47 1	1 52 53	1 58 53	2 5 2	2 11 20	2 17 47	2 24 23	2 31 5	2 37 55	2 44 55	2 52 2	2 59 15	3 6 37	3 14 11
10	1 36 58	1 42 26	1 48 2	1 53 47	1 59 40	2 5 42	2 11 52	2 18 12	2 24 39	2 31 13	2 37 56	2 44 46	2 51 44	2 58 50	3 6 5
11	1 33 1	1 38 14	1 43 35	1 49 6	1 54 44	2 0 31	2 6 25	2 12 28	2 18 39	2 24 59	2 31 25	2 37 59	2 44 42	2 51 31	2 58 27
12	1 29 21	1 34 21	1 39 31	1 44 46	1 50 12	1 55 45	2 1 26	2 7 14	2 13 10	2 19 14	2 25 26	2 31 45	2 38 12	2 44 47	2 51 29
13	1 25 59	1 30 47	1 35 44	1 40 47	1 45 58	1 51 19	1 56 47	2 2 21	2 8 5	2 13 55	2 19 52	2 25 57	2 32 10	2 38 29	2 44 56
14	1 22 50	1 27 27	1 32 13	1 37 3	1 42 3	1 47 11	1 52 26	1 57 48	2 3 19	2 8 55	2 14 39	2 20 32	2 26 30	2 32 36	2 38 50
15	1 19 57	1 24 23	1 28 58	1 33 37	1 38 27	1 43 22	1 48 26	1 53 38	1 58 54	2 4 20	2 9 52	2 15 30	2 21 17	2 27 10	2 33 10
16	1 17 20	1 21 35	1 25 59	1 30 24	1 35 3	1 39 46	1 44 38	1 49 38	1 54 42	1 59 55	2 5 16	2 10 43	2 16 18	2 21 53	2 27 47
17	1 14 44	1 18 50	1 23 4	1 27 24	1 31 52	1 36 27	1 41 9	1 45 58	1 50 54	1 55 56	2 1 6	2 6 22	2 11 44	2 17 2	2 22 49
18	1 12 19	1 16 16	1 20 21	1 24 33	1 28 52	1 33 17	1 37 50	1 42 29	1 47 15	1 52 7	1 57 6	2 2 11	2 7 22	2 12 39	2 18 4
19	1 10 12	1 13 54	1 17 46	1 21 53	1 26 4	1 30 19	1 34 34	1 39 13	1 43 50	1 48 31	1 53 21	1 58 15	2 3 17	2 8 24	2 13 39
20	1 7 57	1 11 38	1 15 27	1 19 22	1 23 23	1 27 31	1 31 46	1 36 7	1 40 34	1 45 7	1 49 46	1 54 32	1 59 24	2 4 21	2 9 31
21	1 6 3	1 9 31	1 13 13	1 17 0	1 20 54	1 24 53	1 28 59	1 33 10	1 37 28	1 41 53	1 46 23	1 50 59	1 55 42	2 0 30	2 5 25
22	1 4 6	1 7 32	1 11 5	1 14 44	1 18 30	1 22 22	1 26 20	1 30 24	1 34 34	1 38 50	1 43 12	1 47 39	1 52 12	1 56 51	2 1 35
23	1 2 15	1 5 35	1 9 1	1 12 34	1 16 13	1 19 58	1 23 49	1 27 45	1 31 46	1 35 53	1 40 6	1 44 26	1 48 51	1 53 22	1 57 58

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	5 22 50	5 34 9	5 45 32	5 57 2	6 8 37	6 20 17	6 32 2	6 43 53	6 55 50	7 7 50	7 19 55	7 32 4	7 44 18	7 56 35	8 8 58
1	5 3 37	5 14 24	5 25 20	5 36 23	5 47 32	5 58 46	6 10 5	6 21 29	6 33 0	6 44 36	6 56 17	7 8 2	7 19 51	7 31 43	7 43 46
2	4 46 17	4 56 38	5 7 8	5 17 44	5 28 26	5 39 15	5 50 8	6 1 13	6 12 15	6 23 26	6 34 42	6 46 5	6 57 31	7 9 0	7 20 39
3	4 30 35	4 40 27	4 50 29	5 0 43	5 11 2	5 21 25	5 31 54	5 42 31	5 53 13	6 4 0	6 14 51	6 25 50	6 36 54	6 48 3	6 59 16
4	4 16 24	4 25 54	4 35 34	4 45 21	4 55 12	5 5 11	5 15 16	5 25 29	5 35 46	5 46 12	5 56 41	6 7 17	6 17 57	6 28 44	6 39 35
5	4 3 29	4 12 35	4 21 50	4 31 13	4 40 43	4 50 19	5 0 1	5 9 50	5 19 45	5 29 47	5 39 55	5 50 15	6 0 40	6 11 1	6 21 22
6	3 51 42	4 0 27	4 9 20	4 18 20	4 27 27	4 36 42	4 46 3	4 55 31	5 5 4	5 14 44	5 24 30	5 34 22	5 44 19	5 54 26	6 4 32
7	3 40 59	3 49 24	3 57 56	4 6 36	4 15 22	4 24 15	4 33 13	4 42 21	4 51 34	5 0 54	5 10 19	5 19 51	5 29 28	5 39 15	5 49 0
8	3 30 59	3 39 4	3 47 16	3 55 35	4 4 0	4 12 33	4 21 13	4 30 0	4 38 53	4 47 52	4 56 58	5 6 10	5 15 28	5 24 52	5 34 21
9	3 21 51	3 29 37	3 37 30	3 45 31	3 53 37	4 1 52	4 10 14	4 18 41	4 27 14	4 35 55	4 44 42	4 53 35	5 2 34	5 11 39	5 20 49
10	3 13 25	3 20 53	3 28 28	3 36 12	3 44 0	3 51 57	4 0 0	4 8 10	4 16 26	4 24 48	4 33 16	4 41 52	4 50 33	4 59 20	5 8 12
11	3 5 33	3 12 45	3 20 4	3 27 29	3 35 1	3 42 40	3 50 26	3 58 19	4 6 18	4 14 33	4 22 34	4 30 52	4 39 15	4 47 45	4 56 20
12	2 58 18	3 5 14	3 12 15	3 19 24	3 26 41	3 34 5	3 41 31	3 49 11	3 56 54	4 4 43	4 12 36	4 20 37	4 28 44	4 36 57	4 45 15
13	2 51 31	2 58 11	3 4 58	3 11 53	3 19 3	3 26 2	3 33 12	3 40 34	3 48 2	3 55 36	4 3 13	4 10 58	4 18 51	4 26 40	4 34 46
14	2 45 10	2 51 37	2 58 10	3 4 50	3 11 36	3 18 27	3 25 27	3 32 35	3 39 43	3 47 3	3 54 29	4 1 55	4 9 33	4 17 17	4 24 58
15	2 39 17	2 45 30	2 51 50	2 58 17	3 4 49	3 11 27	3 18 11	3 25 5	3 31 57	3 39 4	3 46 16	3 53 27	4 0 51	4 8 22	4 15 48
16	2 33 42	2 39 42	2 45 49	2 52 2	2 58 22	3 4 47	3 11 18	3 17 57	3 24 38	3 31 31	3 38 30	3 45 30	3 52 39	3 59 53	4 7 8
17	2 28 32	2 34 20	2 40 15	2 46 15	2 52 22	2 58 34	3 4 53	3 11 17	3 17 47	3 24 27	3 31 13	3 38 2	3 44 56	3 51 55	3 59 0
18	2 23 36	2 29 13	2 34 56	2 40 44	2 46 39	2 52 40	2 58 48	3 5 0	3 11 18	3 17 42	3 24 12	3 30 47	3 37 29	3 44 16	3 51 8
19	2 18 58	2 24 27	2 29 57	2 35 36	2 41 17	2 47 8	2 53 3	2 59 6	3 5 11	3 11 25	3 17 40	3 24 8	3 30 35	3 37 13	3 43 54
20	2 14 34	2 19 50	2 25 12	2 30 39	2 36 12	2 41 51	2 47 35	2 53 26	2 59 23	3 5 23	3 11 25	3 17 38	3 23 57	3 30 21	3 36 49
21	2 10 25	2 15 30	2 20 41	2 25 58	2 31 21	2 36 50	2 42 24	2 48 3	2 53 48	2 59 39	3 5 35	3 11 37	3 17 44	3 23 54	3 30 7
22	2 6 25	2 11 21	2 16 24	2 21 32	2 26 45	2 32 4	2 37 28	2 42 57	2 48 30	2 54 9	2 59 55	3 5 48	3 11 45	3 17 44	3 23 46
23	2 2 40	2 7 29	2 12 2	2 17 18	2 22 21	2 27 30	2 32 44	2 38 4	2 43 30	2 49 0	2 54 33	3 0 15	3 6 2	3 11 52	3 17 44

LATITUDE 11° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 11 25	0 11 43	0 12 33	0 13 43	0 15 13	0 17 6	0 19 20	0 21 53	0 24 33	0 27 40	0 31 5	0 34 50	0 38 53	0 43 15	0 47 53
1	0 11 18	0 11 47	0 12 42	0 13 58	0 15 40	0 17 40	0 20 5	0 22 44	0 25 52	0 29 33	0 33 0	0 37 7	0 41 34	0 46 19	0 51 21
2	0 11 18	0 11 55	0 12 56	0 14 22	0 16 13	0 18 27	0 21 3	0 24 5	0 27 28	0 31 14	0 35 35	0 39 53	0 44 44	0 49 56	0 55 26
3	0 11 17	0 12 3	0 13 10	0 14 47	0 16 51	0 19 22	0 22 16	0 25 39	0 29 26	0 33 38	0 38 14	0 43 14	0 48 36	0 54 21	1 0 25
4	0 11 21	0 12 13	0 13 28	0 15 20	0 17 40	0 20 30	0 23 48	0 27 37	0 31 56	0 36 40	0 41 50	0 47 25	0 53 24	0 59 52	1 6 36
5	0 11 23	0 12 22	0 13 52	0 16 2	0 18 44	0 22 2	0 25 50	0 30 13	0 35 7	0 40 32	0 46 28	0 52 51	0 59 38	1 6 52	1 14 26
6	0 11 28	0 12 38	0 14 24	0 16 57	0 20 10	0 24 6	0 28 33	0 33 44	0 39 29	0 45 48	0 51 38	1 0 1	1 7 46	1 15 59	1 24 37
7	0 11 34	0 13 1	0 15 13	0 18 20	0 22 23	0 27 9	0 32 38	0 38 47	0 45 40	0 53 14	1 1 14	1 9 50	1 18 51	1 28 23	1 38 14
8	0 11 42	0 13 34	0 16 30	0 20 38	0 25 46	0 31 58	0 38 54	0 46 36	0 55 5	1 4 8	1 13 47	1 23 56	1 34 33	1 45 33	1 56 59
9	0 12 3	0 14 51	0 19 12	0 25 1	0 32 3	0 40 29	0 49 39	0 59 36	1 10 13	1 21 27	1 33 8	1 45 13	1 57 38	2 10 17	2 23 11
10	0 12 56	0 18 12	0 25 54	0 35 14	0 46 14	0 58 14	1 10 40	1 23 38	1 36 48	1 50 29	2 4 12	2 18 8	2 32 3	2 46 14	3 0 26
11	Not	calcula	ble.												
12	0 12 53	0 18 14	0 25 29	0 34 54	0 46 1	0 57 56	1 10 14	1 22 51	1 36 28	1 50 6	2 3 44	2 17 24	2 31 29	2 45 39	2 59 45
13	0 12 13	0 14 42	0 18 50	0 24 37	0 31 47	0 39 54	0 49 3	0 58 54	1 9 42	1 20 43	1 32 13	1 44 13	1 56 40	2 9 2	2 21 45
14	0 11 44	0 13 33	0 16 22	0 20 22	0 25 30	0 31 30	0 38 14	0 45 49	0 54 22	1 3 12	1 11 39	1 22 39	1 33 0	1 43 58	1 55 5
15	0 11 38	0 12 52	0 14 59	0 18 11	0 21 57	0 26 40	0 31 55	0 37 59	0 44 49	0 52 11	1 0 2	1 8 21	1 17 22	1 26 31	1 36 11
16	0 11 32	0 12 34	0 14 16	0 16 41	0 19 50	0 23 37	0 27 57	0 32 55	0 38 37	0 44 43	0 51 19	0 58 28	1 6 2	1 13 58	1 22 23
17	0 11 28	0 12 17	0 13 40	0 15 37	0 18 20	0 21 29	0 25 11	0 29 17	0 34 4	0 39 22	0 45 1	0 51 11	0 57 45	1 4 39	1 11 58
18	0 11 24	0 12 9	0 13 22	0 14 58	0 17 21	0 20 1	0 23 14	0 26 49	0 30 55	0 35 32	0 40 26	0 45 46	0 51 35	0 57 44	1 4 11
19	0 11 21	0 11 55	0 12 58	0 14 27	0 16 31	0 18 43	0 21 30	0 24 46	0 28 18	0 32 22	0 36 45	0 41 33	0 46 33	0 52 5	0 57 54
20	0 11 19	0 11 50	0 12 47	0 14 8	0 15 58	0 18 2	0 20 33	0 23 22	0 26 40	0 30 13	0 34 9	0 38 26	0 43 6	0 47 59	0 53 15
21	0 11 16	0 11 44	0 12 37	0 13 49	0 15 22	0 17 15	0 19 29	0 22 4	0 24 57	0 28 11	0 31 42	0 35 33	0 39 47	0 44 14	0 48 58
22	0 11 13	0 11 39	0 12 27	0 13 32	0 14 57	0 16 41	0 18 39	0 20 59	0 23 38	0 26 33	0 29 46	0 33 15	0 37 3	0 41 8	0 45 26
23	0 11 12	0 11 36	0 12 20	0 13 19	0 14 35	0 16 10	0 18 0	0 20 5	0 22 31	0 25 7	0 28 2	0 31 13	0 34 45	0 38 27	0 42 24

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 11 25	0 11 43	0 12 33	0 13 43	0 15 13	0 17 6	0 19 20	0 21 53	0 24 33	0 27 40	0 31 5	0 34 50	0 38 53	0 43 15	0 47 53
1	0 11 13	0 11 38	0 12 24	0 13 29	0 14 51	0 16 33	0 18 33	0 20 38	0 23 27	0 26 22	0 29 28	0 32 54	0 36 40	0 40 42	0 44 59
2	0 11 10	0 11 34	0 12 17	0 13 17	0 14 34	0 16 8	0 17 58	0 20 6	0 22 28	0 25 10	0 28 6	0 31 18	0 34 45	0 38 27	0 42 26
3	0 11 7	0 11 32	0 12 10	0 13 7	0 14 18	0 15 46	0 17 29	0 19 26	0 21 40	0 24 9	0 26 54	0 29 54	0 33 7	0 36 35	0 40 17
4	0 11 5	0 11 29	0 12 5	0 12 58	0 14 5	0 15 25	0 17 1	0 18 51	0 20 57	0 23 17	0 25 51	0 28 37	0 31 38	0 34 55	0 38 24
5	0 11 4	0 11 26	0 12 0	0 12 50	0 13 52	0 15 8	0 16 38	0 18 21	0 20 19	0 22 30	0 24 56	0 27 31	0 30 23	0 33 27	0 36 44
6	0 11 2	0 11 24	0 11 55	0 12 41	0 13 41	0 14 53	0 16 16	0 17 55	0 19 46	0 21 51	0 24 5	0 26 34	0 29 16	0 32 8	0 35 13
7	0 11 1	0 11 20	0 11 49	0 12 33	0 13 29	0 14 37	0 15 58	0 17 29	0 19 11	0 21 12	0 23 20	0 25 40	0 28 13	0 30 58	0 33 53
8	0 11 0	0 11 18	0 11 46	0 12 27	0 13 20	0 14 25	0 15 39	0 17 9	0 18 46	0 20 37	0 22 39	0 24 51	0 27 18	0 29 55	0 32 41
9	0 10 58	0 11 16	0 11 43	0 12 22	0 13 12	0 14 14	0 15 25	0 16 48	0 18 22	0 20 6	0 22 3	0 24 10	0 26 27	0 28 56	0 31 34
10	0 10 56	0 11 13	0 11 40	0 12 17	0 13 5	0 14 3	0 15 12	0 16 31	0 18 0	0 19 41	0 21 31	0 23 32	0 25 42	0 28 3	0 30 35
11	0 10 55	0 11 12	0 11 36	0 12 12	0 12 57	0 13 53	0 14 58	0 16 13	0 17 38	0 19 14	0 20 58	0 22 55	0 25 0	0 27 15	0 29 38
12	0 10 54	0 11 9	0 11 32	0 12 6	0 12 50	0 13 42	0 14 43	0 15 59	0 17 20	0 18 51	0 20 30	0 22 22	0 24 21	0 26 30	0 28 47
13	0 10 52	0 11 6	0 11 27	0 12 0	0 12 42	0 13 32	0 14 31	0 15 41	0 17 5	0 18 27	0 20 3	0 21 50	0 23 45	0 25 47	0 27 59
14	0 10 51	0 11 4	0 11 24	0 11 56	0 12 36	0 13 24	0 14 20	0 15 24	0 16 52	0 18 4	0 19 38	0 21 19	0 23 11	0 25 7	0 27 15
15	0 10 50	0 11 3	0 11 23	0 11 53	0 12 32	0 13 18	0 14 12	0 15 15	0 16 28	0 17 49	0 19 17	0 20 53	0 22 40	0 24 35	0 26 35
16	0 10 49	0 11 2	0 11 21	0 11 49	0 12 26	0 13 11	0 14 4	0 15 5	0 16 14	0 17 31	0 18 57	0 20 29	0 22 11	0 24 3	0 25 58
17	0 10 49	0 11 0	0 11 19	0 11 46	0 12 21	0 13 4	0 13 57	0 14 55	0 16 1	0 17 15	0 18 38	0 20 7	0 21 45	0 23 31	0 25 23
18	0 10 46	0 10 57	0 11 16	0 11 41	0 12 16	0 12 57	0 13 48	0 14 44	0 15 48	0 16 59	0 18 19	0 19 45	0 21 21	0 22 59	0 24 49
19	0 10 44	0 10 55	0 11 13	0 11 37	0 12 11	0 12 52	0 13 39	0 14 33	0 15 34	0 16 44	0 17 59	0 19 24	0 20 54	0 22 33	0 24 18
20	0 10 44	0 10 54	0 11 10	0 11 34	0 12 7	0 12 46	0 13 31	0 14 23	0 15 24	0 16 30	0 17 44	0 19 4	0 20 32	0 22 5	0 23 47
21	0 10 41	0 10 51	0 11 7	0 11 30	0 12 3	0 12 40	0 13 23	0 14 14	0 15 12	0 16 17	0 17 27	0 18 45	0 20 11	0 21 42	0 23 19
22	0 10 40	0 10 50	0 11 6	0 11 28	0 11 59	0 12 35	0 13 17	0 14 6	0 15 2	0 16 3	0 17 12	0 18 28	0 19 49	0 21 18	0 22 52
23	0 10 38	0 10 47	0 11 3	0 11 25	0 11 53	0 12 28	0 13 9	0 13 59	0 14 51	0 15 51	0 16 57	0 18 9	0 19 31	0 20 56	0 22 27

LATITUDE 11° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 52 48	0 58 5	1 3 30	1 9 8	1 15 17	1 21 31	1 28 1	1 34 48	1 41 46	1 48 58	1 56 26	2 4 5	2 11 56	2 20 1	2 28 15
1	0 56 40	1 2 22	1 8 17	1 14 28	1 20 56	1 27 44	1 34 47	1 42 0	1 49 31	1 57 17	2 5 15	2 13 25	2 21 49	2 30 29	2 39 16
2	1 1 18	1 7 26	1 13 57	1 20 43	1 27 46	1 35 3	1 42 41	1 50 30	1 58 38	2 6 58	2 15 31	2 24 17	2 33 16	2 42 28	2 51 54
3	1 6 52	1 13 37	1 20 45	1 28 8	1 35 49	1 43 46	1 52 3	2 0 33	2 9 19	2 18 19	2 27 32	2 36 59	2 46 37	2 56 27	3 6 33
4	1 13 45	1 21 14	1 29 4	1 37 13	1 45 40	1 54 22	2 3 24	2 12 40	2 23 9	2 31 53	2 41 50	2 52 0	3 2 22	3 12 54	3 23 40
5	1 22 26	1 30 46	1 39 29	1 48 29	1 57 50	2 7 21	2 17 15	2 27 21	2 37 40	2 48 12	2 58 59	3 9 55	3 20 57	3 32 22	3 43 50
6	1 33 37	1 42 59	1 52 44	2 2 44	2 13 2	2 23 33	2 34 23	2 45 23	2 56 38	3 8 2	3 19 41	3 31 28	3 43 27	3 55 29	4 7 46
7	1 48 28	1 59 2	2 9 55	2 21 4	2 32 26	2 43 58	2 55 16	3 7 51	3 19 7	3 32 24	3 44 58	3 57 35	4 10 21	4 23 11	4 36 42
8	2 8 28	2 20 25	2 32 35	2 44 58	2 57 29	3 10 15	3 23 4	3 36 4	3 49 12	4 2 31	4 15 50	4 29 14	4 42 47	4 56 28	5 10 4
9	2 36 13	2 49 29	3 2 56	3 16 26	3 30 7	3 43 46	3 57 37	4 11 27	4 25 27	4 39 28	4 53 35	5 7 39	5 21 48	5 36 1	5 50 16
10	3 14 44	2 28 56	3 43 25	3 57 48	4 12 14	4 26 43	4 41 11	4 55 45	5 10 13	5 24 48	5 39 22	5 53 56	6 8 31	6 23 7	6 37 43
11	Not	calcula	ble.												
12	3 13 45	3 28 19	3 42 34	3 56 48	4 11 14	4 25 44	4 40 3	4 54 35	5 9 2	5 23 31	5 37 59	5 52 37	6 7 5	6 21 38	6 36 17
13	2 34 45	2 47 54	3 1 15	3 14 40	3 28 2	3 41 46	3 55 40	4 9 17	4 23 1	4 37 5	4 51 0	5 5 3	5 19 0	5 33 13	5 47 22
14	2 6 37	2 18 25	2 30 18	2 42 36	2 54 52	3 7 30	3 20 21	3 32 57	3 45 56	3 59 8	4 12 17	4 25 31	4 38 50	4 52 20	5 5 53
15	1 46 13	1 56 38	2 7 20	2 18 1	2 29 20	2 40 47	2 52 22	3 4 11	3 16 1	3 28 14	3 40 37	3 52 53	4 5 29	4 18 14	4 30 53
16	1 31 10	1 40 23	1 49 45	1 59 33	2 9 31	2 19 51	2 30 21	2 41 3	2 52 3	3 3 13	3 14 36	3 26 0	3 37 3	3 49 39	4 1 33
17	1 19 47	1 28 1	1 36 14	1 44 46	1 53 47	2 3 20	2 12 45	2 23 32	2 32 32	2 42 46	2 53 15	3 3 50	3 14 40	3 25 33	3 36 52
18	1 11 4	1 18 14	1 25 46	1 33 32	1 41 39	1 50 1	1 58 45	2 7 38	2 16 42	2 26 4	2 35 43	2 45 30	2 55 30	3 5 41	3 16 0
19	1 4 0	1 10 29	1 17 13	1 24 12	1 31 32	1 39 13	1 47 0	1 55 13	2 3 31	2 12 9	2 20 57	2 30 7	2 39 12	2 48 44	2 58 16
20	0 58 48	1 4 41	1 10 51	1 17 15	1 23 57	1 30 59	1 38 11	1 45 40	1 53 20	2 1 19	2 9 28	2 17 48	2 26 22	2 35 10	2 44 9
21	0 53 59	0 59 22	1 4 59	1 10 48	1 16 56	1 23 19	1 29 56	1 36 50	1 43 54	1 51 13	1 58 48	2 6 29	2 14 27	2 22 34	2 30 56
22	0 50 1	0 54 58	1 0 4	1 5 25	1 11 3	1 16 56	1 23 1	1 29 22	1 35 55	1 42 40	1 49 42	1 56 52	2 4 13	2 11 48	2 19 38
23	0 46 38	0 51 11	0 55 50	1 0 47	1 5 59	1 11 23	1 17 2	1 22 53	1 28 59	1 35 17	1 41 46	1 48 29	1 55 22	2 2 25	2 9 40

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 52 48	0 58 5	1 3 30	1 9 8	1 15 17	1 21 31	1 28 1	1 34 48	1 41 46	1 48 58	1 56 26	2 4 5	2 11 56	2 20 1	2 28 15
1	0 49 32	0 54 24	0 59 27	1 4 47	1 10 23	1 16 12	1 22 17	1 28 34	1 35 5	1 41 50	1 48 48	1 55 58	2 3 23	2 11 0	2 18 43
2	0 46 41	0 51 11	0 55 56	1 0 52	1 6 7	1 11 33	1 17 14	1 23 8	1 29 16	1 35 35	1 42 8	1 48 52	1 55 50	2 2 56	2 10 18
3	0 44 16	0 48 28	0 52 56	0 57 35	1 2 27	1 7 32	1 12 52	1 18 25	1 24 10	1 30 9	1 36 17	1 42 39	1 49 12	1 55 57	2 2 52
4	0 42 8	0 46 4	0 50 14	0 54 38	0 59 13	1 4 0	1 9 2	1 14 15	1 19 41	1 25 18	1 31 6	1 37 7	1 43 18	1 49 41	1 56 15
5	0 40 13	0 43 56	0 47 52	0 52 0	0 56 20	1 0 50	1 5 36	1 10 32	1 15 40	1 20 58	1 26 28	1 32 10	1 38 2	1 44 5	1 50 18
6	0 38 32	0 42 2	0 45 45	0 49 39	0 53 46	0 58 2	1 2 31	1 7 11	1 12 3	1 17 5	1 22 18	1 27 43	1 33 18	1 39 1	1 44 58
7	0 37 1	0 40 20	0 43 51	0 47 33	0 51 26	0 55 30	0 59 45	1 4 12	1 8 49	1 13 33	1 18 33	1 23 39	1 29 0	1 34 27	1 40 7
8	0 35 38	0 38 47	0 42 8	0 45 39	0 49 21	0 53 15	0 57 15	1 1 28	1 5 51	1 10 27	1 15 9	1 20 2	1 25 6	1 30 20	1 35 41
9	0 34 24	0 37 23	0 40 34	0 43 54	0 47 29	0 51 6	0 54 58	0 58 59	1 3 10	1 7 31	1 12 2	1 16 42	1 21 32	1 26 31	1 31 39
10	0 33 16	0 36 7	0 39 10	0 42 21	0 45 42	0 49 13	0 52 54	0 56 45	1 0 43	1 4 52	1 9 12	1 13 40	1 18 17	1 23 3	1 27 58
11	0 32 13	0 34 57	0 37 51	0 40 53	0 44 5	0 47 27	0 50 58	0 54 38	0 58 28	1 2 27	1 6 34	1 10 52	1 15 16	1 19 48	1 24 32
12	0 31 16	0 33 52	0 36 38	0 39 33	0 42 38	0 45 50	0 49 14	0 52 44	0 56 24	1 0 13	1 4 10	1 8 16	1 12 29	1 16 53	1 21 24
13	0 30 21	0 32 51	0 35 30	0 38 17	0 42 13	0 44 25	0 47 34	0 50 55	0 54 27	0 58 5	1 1 52	1 5 44	1 9 52	1 14 5	1 18 26
14	0 29 31	0 31 56	0 34 29	0 37 8	0 39 57	0 43 8	0 46 3	0 49 16	0 52 40	0 56 8	0 59 46	1 3 24	1 7 27	1 11 30	1 15 42
15	0 28 45	0 31 5	0 33 31	0 36 7	0 38 45	0 41 40	0 44 38	0 47 44	0 50 59	0 54 24	0 57 54	1 1 33	1 5 20	1 9 13	1 13 15
16	0 28 2	0 30 16	0 32 37	0 35 7	0 37 40	0 40 27	0 43 19	0 46 19	0 49 26	0 52 44	0 56 6	0 59 37	1 3 16	1 7 1	1 10 54
17	0 27 23	0 29 32	0 31 46	0 34 11	0 36 41	0 39 20	0 42 7	0 45 1	0 48 1	0 51 11	0 54 25	0 57 48	1 1 19	1 4 57	1 8 42
18	0 26 44	0 28 49	0 30 58	0 33 17	0 35 42	0 38 17	0 40 55	0 43 44	0 46 38	0 49 41	0 52 48	0 56 4	0 59 26	1 2 58	1 6 34
19	0 26 10	0 28 9	0 30 15	0 32 28	0 34 49	0 37 17	0 39 50	0 42 32	0 45 20	0 48 16	0 51 17	0 54 26	0 57 42	1 1 3	1 4 34
20	0 25 36	0 27 31	0 29 34	0 31 44	0 34 0	0 36 22	0 38 52	0 41 29	0 44 10	0 47 1	0 49 54	0 52 56	0 56 5	0 59 19	1 2 44
21	0 25 4	0 26 55	0 28 53	0 30 57	0 33 9	0 35 26	0 37 51	0 40 22	0 43 0	0 45 43	0 48 33	0 51 28	0 54 30	0 57 31	1 0 54
22	0 24 34	0 26 24	0 28 17	0 30 17	0 32 24	0 34 37	0 36 56	0 39 19	0 41 52	0 44 27	0 47 13	0 50 3	0 53 0	0 56 13	0 59 17
23	0 24 3	0 25 49	0 27 38	0 29 35	0 31 43	0 33 45	0 36 1	0 38 21	0 40 49	0 43 22	0 46 2	0 48 48	0 51 39	0 54 36	0 57 39

LATITUDE 11° NORTH OR SOUTH.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	2 36 45	2 45 22	2 54 12	3 3 11	3 12 22	3 21 40	3 31 9	3 40 48	3 50 35	4 0 31	4 10 34	4 20 48	4 31 5	4 41 31	4 52 6
1	2 26 40	2 34 49	2 43 10	2 51 40	3 0 21	3 9 11	3 18 13	3 27 21	3 36 37	3 46 5	3 55 39	4 5 22	4 15 13	4 25 2	4 35 20
2	2 17 49	2 25 32	2 33 23	2 41 28	2 49 39	2 58 3	3 6 35	3 15 17	3 24 8	3 33 8	3 42 18	3 51 35	4 0 59	4 10 32	4 20 12
3	2 9 59	2 17 17	2 24 46	2 32 23	2 40 10	2 48 8	2 56 15	3 4 33	3 12 58	3 21 32	3 30 15	3 39 7	3 48 6	3 57 14	4 6 28
4	2 3 0	2 9 47	2 16 59	2 24 15	2 31 38	2 39 14	2 46 58	2 54 51	3 2 52	3 11 4	3 19 23	3 27 51	3 36 26	3 45 11	3 54 2
5	1 56 42	2 3 16	2 10 0	2 16 55	2 23 58	2 31 11	2 38 32	2 46 4	2 53 44	3 1 34	3 9 31	3 17 37	3 25 51	3 34 12	3 42 41
6	1 51 2	1 57 17	2 3 42	2 10 16	2 17 0	2 23 54	2 30 55	2 38 5	2 45 26	2 52 56	3 0 31	3 8 17	3 16 9	3 24 11	3 32 19
7	1 45 53	1 51 51	1 57 58	2 4 15	2 10 40	2 17 5	2 23 58	2 30 49	2 37 50	2 45 1	2 52 18	2 59 44	3 7 18	3 15 0	3 22 47
8	1 41 13	1 46 55	1 52 45	1 58 46	2 4 54	2 11 10	2 17 36	2 24 13	2 30 55	2 37 45	2 44 46	2 51 53	2 59 10	3 6 32	3 14 3
9	1 36 55	1 42 23	1 47 57	1 53 43	1 59 35	2 5 36	2 11 47	2 18 5	2 24 31	2 31 6	2 37 48	2 44 40	2 51 38	2 58 43	3 5 56
10	1 33 1	1 38 14	1 43 35	1 49 6	1 54 44	2 0 31	2 6 25	2 12 28	2 18 39	2 24 59	2 31 25	2 37 59	2 44 42	2 51 31	2 58 27
11	1 29 23	1 34 23	1 39 31	1 44 47	1 50 13	1 55 45	2 0 26	2 7 16	2 13 12	2 19 16	2 25 28	2 31 47	2 38 15	2 44 48	2 51 31
12	1 26 3	1 30 51	1 35 47	1 40 50	1 46 3	1 51 23	1 56 50	2 2 27	2 8 10	2 14 0	2 19 58	2 26 3	2 32 16	2 38 36	2 45 3
13	1 22 55	1 27 32	1 32 17	1 37 8	1 42 9	1 47 17	1 52 32	1 57 56	2 3 27	2 9 3	2 14 47	2 20 40	2 26 38	2 32 44	2 38 58
14	1 20 2	1 24 28	1 29 3	1 33 43	1 38 32	1 43 29	1 48 32	1 53 45	1 59 2	2 4 26	2 9 56	2 15 39	2 21 24	2 27 17	2 33 18
15	1 17 21	1 21 37	1 26 3	1 30 31	1 35 11	1 39 56	1 44 49	1 49 50	1 54 56	2 0 11	2 5 32	2 10 57	2 16 32	2 22 14	2 28 3
16	1 14 53	1 18 59	1 23 14	1 27 32	1 32 2	1 36 38	1 41 20	1 46 10	1 51 6	1 56 8	2 1 18	2 6 33	2 11 56	2 17 26	2 23 0
17	1 12 34	1 16 30	1 20 35	1 24 44	1 29 4	1 33 31	1 38 4	1 42 44	1 47 30	1 52 21	1 57 21	2 2 26	2 7 38	2 12 57	2 18 23
18	1 10 19	1 14 8	1 18 5	1 22 6	1 26 15	1 30 31	1 34 54	1 39 25	1 44 2	1 48 45	1 53 35	1 58 31	2 3 32	2 8 40	2 13 57
19	1 8 14	1 11 46	1 15 36	1 19 31	1 23 35	1 27 43	1 31 50	1 36 20	1 40 49	1 45 22	1 50 4	1 54 50	1 59 44	2 4 42	2 9 48
20	1 6 9	1 9 42	1 13 24	1 17 12	1 21 6	1 25 7	1 29 14	1 33 27	1 37 46	1 42 11	1 46 42	1 51 19	1 56 3	2 0 51	2 5 51
21	1 4 22	1 7 37	1 11 14	1 14 55	1 18 42	1 22 38	1 26 36	1 30 39	1 34 49	1 39 6	1 43 29	1 47 57	1 52 33	1 57 14	2 2 0
22	1 2 31	1 5 51	1 9 17	1 12 49	1 16 29	1 20 15	1 24 6	1 28 3	1 32 6	1 36 15	1 40 29	1 44 49	1 49 15	1 53 46	1 58 24
23	1 0 48	1 3 59	1 7 20	1 10 47	1 14 20	1 17 59	1 21 44	1 25 33	1 29 27	1 33 28	1 37 36	1 41 49	1 46 6	1 50 29	1 54 58

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	5 2 46	5 13 35	5 24 31	5 35 30	5 46 35	5 57 48	6 9 7	6 20 31	6 31 58	6 43 34	6 55 13	7 6 57	7 18 45	7 30 39	7 42 36
1	4 45 34	4 55 5	5 6 22	5 16 54	5 27 36	5 38 23	5 49 15	6 0 14	6 11 18	6 22 28	6 33 44	6 45 7	6 56 32	7 8 1	7 19 33
2	4 29 59	4 39 55	4 49 57	5 0 6	5 10 22	5 20 43	5 31 12	5 41 46	5 52 25	6 3 13	6 14 5	6 28 1	6 36 4	6 47 10	6 58 22
3	4 15 52	4 25 22	4 35 0	4 44 49	4 54 36	5 4 35	5 14 38	5 24 56	5 35 7	5 45 30	5 55 42	6 6 33	6 17 12	6 27 59	6 38 50
4	4 3 3	4 12 9	4 21 24	4 30 46	4 40 11	4 49 49	4 59 31	5 9 19	5 19 13	5 29 15	5 39 21	5 49 24	5 59 52	6 10 15	6 20 46
5	3 51 19	4 0 4	4 8 56	4 17 56	4 27 2	4 36 16	4 45 36	4 55 3	5 4 36	5 14 14	5 24 1	5 33 51	5 43 49	5 53 52	6 4 0
6	3 40 37	3 49 0	3 57 32	4 6 10	4 14 57	4 23 49	4 32 49	4 41 54	4 51 6	5 0 25	5 9 51	5 19 20	5 28 57	5 38 40	5 48 29
7	3 30 44	3 38 48	3 47 1	3 55 21	4 3 46	4 12 19	4 20 58	4 29 44	4 38 36	4 47 35	4 56 41	5 5 52	5 15 10	5 24 32	5 34 3
8	3 21 40	3 29 27	3 37 20	3 45 22	3 53 27	4 1 41	4 10 2	4 18 30	4 27 3	4 35 43	4 44 30	4 53 24	5 2 22	5 11 24	5 20 35
9	3 13 18	3 20 47	3 28 21	3 36 3	3 43 53	3 51 49	3 59 51	4 8 35	4 16 8	4 24 40	4 33 8	4 41 43	4 50 24	4 59 10	5 8 3
10	3 5 33	3 12 45	3 20 4	3 27 29	3 35 1	3 42 40	3 50 26	3 58 19	4 6 18	4 14 33	4 22 34	4 30 52	4 39 15	4 47 45	4 56 20
11	2 58 20	3 5 16	3 12 18	3 19 29	3 26 40	3 34 7	3 41 37	3 49 14	3 56 57	4 4 45	4 12 40	4 20 41	4 28 48	4 36 57	4 45 21
12	2 51 37	2 58 18	3 5 6	3 12 1	3 18 47	3 26 10	3 33 24	3 40 45	3 48 12	3 55 40	4 3 25	4 11 10	4 19 2	4 27 0	4 35 2
13	2 45 18	2 51 45	2 58 19	3 4 59	3 11 38	3 18 38	3 25 37	3 32 44	3 39 55	3 47 12	3 54 40	4 2 10	4 9 46	4 17 30	4 25 14
14	2 39 26	2 45 40	2 52 0	2 58 26	3 4 59	3 11 37	3 18 22	3 25 16	3 32 11	3 39 17	3 46 28	3 53 43	4 1 4	4 8 35	4 16 2
15	2 33 58	2 39 59	2 46 7	2 52 21	2 58 40	3 5 5	3 11 36	3 18 15	3 24 56	3 31 50	3 38 46	3 45 45	3 52 55	4 0 12	4 7 28
16	2 28 47	2 34 36	2 40 32	2 46 32	2 52 38	2 58 50	3 5 10	3 11 35	3 18 5	3 24 46	3 31 30	3 38 17	3 45 12	3 52 16	3 59 20
17	2 23 56	2 29 33	2 35 17	2 41 5	2 46 59	2 52 59	2 59 8	3 5 21	3 11 40	3 18 8	3 24 41	3 31 17	3 37 58	3 44 49	3 51 41
18	2 19 19	2 24 46	2 30 19	2 35 56	2 41 41	2 47 30	2 53 26	2 59 29	3 5 36	3 11 49	3 18 6	3 24 30	3 31 2	3 37 39	3 44 18
19	2 14 58	2 20 15	2 25 33	2 31 2	2 36 33	2 42 14	2 47 59	2 53 52	2 59 47	3 5 49	3 11 51	3 18 8	3 24 23	3 31 0	3 37 30
20	2 10 47	2 15 54	2 21 6	2 26 24	2 31 48	2 37 18	2 42 52	2 48 33	2 54 20	3 0 11	3 6 6	3 12 8	3 18 16	3 24 28	3 30 46
21	2 6 51	2 11 48	2 16 51	2 22 0	2 27 14	2 32 33	2 37 58	2 43 28	2 49 4	2 54 46	3 0 33	3 6 24	3 12 21	3 18 21	3 24 26
22	2 3 6	2 7 55	2 12 49	2 17 48	2 22 52	2 28 2	2 33 17	2 38 39	2 44 5	2 49 35	2 55 11	3 0 55	3 6 43	3 12 33	3 18 26
23	1 59 33	2 4 14	2 8 58	2 13 48	2 18 43	2 23 44	2 28 50	2 34 2	2 39 19	2 44 42	2 50 6	2 55 39	3 1 17	3 6 58	3 12 42

LATITUDE 12° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 11 10	0 11 40	0 12 26	0 13 30	0 14 51	0 16 34	0 18 34	0 20 51	0 23 24	0 26 17	0 29 26	0 32 54	0 36 36	0 40 38	0 44 53
1	0 11 16	0 11 43	0 12 34	0 13 42	0 15 16	0 17 6	0 19 15	0 21 40	0 24 31	0 27 38	0 31 4	0 34 44	0 38 51	0 43 10	0 47 45
2	0 11 18	0 11 47	0 12 42	0 13 58	0 15 39	0 17 40	0 19 59	0 22 42	0 25 47	0 29 13	0 32 56	0 37 0	0 41 29	0 46 11	0 51 11
3	0 11 19	0 11 52	0 12 53	0 14 19	0 16 12	0 18 27	0 20 58	0 23 56	0 27 25	0 31 11	0 35 17	0 39 44	0 44 38	0 49 47	0 55 15
4	0 11 23	0 11 58	0 13 11	0 14 42	0 16 49	0 19 20	0 22 14	0 25 33	0 29 21	0 33 33	0 38 8	0 43 2	0 48 29	0 54 14	1 0 13
5	0 11 26	0 12 13	0 13 29	0 15 15	0 17 37	0 20 26	0 23 43	0 27 31	0 31 46	0 36 34	0 41 55	0 47 16	0 53 15	0 59 37	1 6 23
6	0 11 30	0 12 22	0 13 49	0 15 54	0 18 42	0 21 54	0 25 42	0 30 1	0 34 57	0 40 29	0 46 17	0 52 38	0 59 25	1 6 36	1 14 9
7	0 11 34	0 12 37	0 14 12	0 16 48	0 20 14	0 23 57	0 28 30	0 33 37	0 39 21	0 45 40	0 52 25	0 59 41	1 7 30	1 15 41	1 24 17
8	0 11 40	0 12 55	0 15 13	0 18 18	0 22 24	0 26 55	0 32 27	0 38 40	0 45 39	0 53 0	1 0 58	1 9 30	1 18 35	1 27 56	1 37 44
9	0 11 44	0 13 36	0 16 30	0 20 25	0 25 44	0 31 42	0 38 39	0 46 18	0 54 52	1 3 52	1 13 25	1 23 34	1 34 12	1 45 0	1 56 22
10	0 12 13	0 14 44	0 18 54	0 24 42	0 32 13	0 40 13	0 49 23	0 59 13	1 10 6	1 20 55	1 32 43	1 44 44	1 57 8	2 9 46	2 22 35
11	0 12 53	0 18 14	0 25 29	0 34 54	0 46 1	0 57 56	1 10 14	1 22 51	1 36 28	1 50 6	2 3 44	2 17 24	2 31 29	2 45 39	2 59 45
12	Not calculable.														
13	0 12 50	0 17 50	0 25 20	0 34 50	0 45 50	0 57 45	1 9 54	1 22 43	1 36 14	1 49 28	2 3 4	2 16 44	2 40 44	2 44 51	2 58 54
14	0 12 13	0 14 42	0 18 47	0 24 37	0 31 42	0 39 47	0 48 47	0 58 42	1 9 16	1 20 15	1 21 45	1 43 37	1 55 59	2 8 31	2 20 57
15	0 11 44	0 13 33	0 16 18	0 20 18	0 25 30	0 31 14	0 37 58	0 45 36	0 53 55	1 2 52	1 12 14	1 22 12	1 32 37	1 43 22	1 54 31
16	0 11 38	0 12 49	0 14 57	0 17 59	0 21 55	0 26 33	0 31 49	0 37 47	0 44 43	0 51 47	0 59 42	1 7 57	1 16 42	1 25 58	1 35 35
17	0 11 32	0 12 32	0 14 16	0 16 40	0 19 45	0 23 30	0 27 48	0 32 46	0 38 28	0 44 25	0 50 59	0 58 2	1 5 40	1 13 31	1 21 48
18	0 11 28	0 12 18	0 13 42	0 15 41	0 18 20	0 21 32	0 25 9	0 29 16	0 33 57	0 39 12	0 44 47	0 50 53	0 57 24	1 4 20	1 12 35
19	0 11 24	0 12 9	0 13 21	0 14 56	0 17 17	0 19 55	0 23 8	0 26 40	0 30 49	0 35 16	0 40 13	0 45 29	0 51 14	0 57 21	1 3 41
20	0 11 21	0 11 56	0 13 0	0 14 31	0 16 33	0 18 48	0 21 36	0 24 42	0 28 20	0 32 17	0 36 36	0 41 17	0 46 26	0 51 45	0 57 33
21	0 11 17	0 11 48	0 12 18	0 14 7	0 15 51	0 17 53	0 20 20	0 23 11	0 26 20	0 29 57	0 33 43	0 37 54	0 42 29	0 47 22	0 52 30
22	0 11 15	0 11 44	0 12 36	0 13 46	0 15 20	0 17 13	0 19 23	0 21 53	0 24 46	0 27 56	0 31 25	0 35 12	0 39 21	0 43 44	0 48 22
23	0 11 14	0 11 40	0 12 27	0 13 30	0 14 52	0 16 36	0 18 35	0 20 49	0 23 27	0 26 20	0 29 30	0 32 54	0 36 41	0 40 40	0 44 55

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 11 10	0 11 40	0 12 26	0 13 30	0 14 51	0 16 34	0 18 34	0 20 51	0 23 24	0 26 17	0 29 26	0 32 54	0 36 36	0 40 38	0 44 53
1	0 11 9	0 11 36	0 12 19	0 13 15	0 14 33	0 16 9	0 17 59	0 20 7	0 22 29	0 25 10	0 28 6	0 31 20	0 34 48	0 38 34	0 42 34
2	0 11 8	0 11 32	0 12 12	0 13 3	0 14 17	0 15 46	0 17 28	0 19 27	0 21 40	0 24 10	0 26 54	0 29 55	0 33 10	0 36 41	0 40 26
3	0 11 7	0 11 29	0 12 5	0 12 53	0 14 3	0 15 25	0 17 1	0 18 51	0 20 56	0 23 16	0 25 50	0 28 39	0 31 42	0 34 59	0 38 30
4	0 11 6	0 11 26	0 11 59	0 12 45	0 13 50	0 15 6	0 16 37	0 18 19	0 20 17	0 22 28	0 24 53	0 27 31	0 30 23	0 33 27	0 36 45
5	0 11 5	0 11 23	0 11 53	0 12 39	0 13 39	0 14 49	0 16 16	0 17 51	0 19 43	0 21 46	0 24 3	0 26 31	0 29 13	0 32 5	0 35 11
6	0 11 4	0 11 20	0 11 49	0 12 32	0 13 29	0 14 35	0 15 57	0 17 27	0 19 12	0 21 8	0 23 18	0 25 38	0 28 12	0 30 56	0 33 53
7	0 11 2	0 11 17	0 11 45	0 12 26	0 13 20	0 14 23	0 15 40	0 17 6	0 18 45	0 20 35	0 22 38	0 24 51	0 27 18	0 29 53	0 32 41
8	0 11 0	0 11 15	0 11 41	0 12 20	0 13 12	0 14 12	0 15 25	0 16 47	0 18 21	0 20 6	0 22 3	0 24 9	0 26 29	0 28 56	0 31 38
9	0 10 58	0 11 13	0 11 38	0 12 15	0 13 5	0 14 2	0 15 11	0 16 29	0 17 59	0 19 39	0 21 30	0 23 30	0 25 43	0 28 3	0 30 34
10	0 10 56	0 11 11	0 11 35	0 12 10	0 12 58	0 13 52	0 14 57	0 16 12	0 17 38	0 19 14	0 20 59	0 22 54	0 24 59	0 27 14	0 29 38
11	0 10 54	0 11 9	0 11 32	0 12 6	0 12 51	0 13 43	0 14 45	0 15 57	0 17 18	0 18 50	0 20 31	0 22 20	0 24 20	0 26 29	0 28 47
12	0 10 53	0 11 7	0 11 29	0 12 2	0 12 45	0 13 34	0 14 34	0 15 43	0 17 0	0 18 28	0 20 5	0 21 49	0 23 44	0 25 47	0 28 0
13	0 10 52	0 11 5	0 11 26	0 11 58	0 12 39	0 13 26	0 14 24	0 15 30	0 16 44	0 18 8	0 19 41	0 21 21	0 23 12	0 25 9	0 27 17
14	0 10 51	0 11 3	0 11 23	0 11 54	0 12 33	0 13 18	0 14 14	0 15 17	0 16 29	0 17 49	0 19 19	0 20 55	0 22 42	0 24 34	0 26 37
15	0 10 50	0 11 2	0 11 21	0 11 50	0 12 27	0 13 11	0 14 5	0 15 5	0 16 15	0 17 32	0 18 58	0 20 30	0 22 13	0 24 2	0 26 0
16	0 10 49	0 11 0	0 11 19	0 11 46	0 12 22	0 13 5	0 13 56	0 14 54	0 16 1	0 17 15	0 18 38	0 20 7	0 21 45	0 23 31	0 25 25
17	0 10 48	0 10 58	0 11 17	0 11 42	0 12 17	0 12 59	0 13 48	0 14 44	0 15 48	0 16 59	0 18 19	0 19 46	0 21 19	0 23 2	0 24 52
18	0 10 46	0 10 56	0 11 14	0 11 38	0 12 12	0 12 53	0 13 40	0 14 34	0 15 36	0 16 45	0 18 1	0 19 26	0 20 58	0 22 34	0 24 20
19	0 10 44	0 10 54	0 11 11	0 11 34	0 12 8	0 12 47	0 13 32	0 14 24	0 15 24	0 16 31	0 17 44	0 19 7	0 20 33	0 22 8	0 23 50
20	0 10 42	0 10 52	0 11 8	0 11 31	0 12 4	0 12 41	0 13 24	0 14 15	0 15 13	0 16 18	0 17 28	0 18 47	0 20 12	0 21 43	0 23 21
21	0 10 40	0 10 50	0 11 5	0 11 28	0 11 59	0 12 35	0 13 17	0 14 6	0 15 2	0 16 5	0 17 13	0 18 29	0 19 52	0 21 20	0 22 54
22	0 10 38	0 10 48	0 11 2	0 11 25	0 11 54	0 12 29	0 13 11	0 13 58	0 14 52	0 15 52	0 16 59	0 18 12	0 19 32	0 20 57	0 22 29
23	0 10 36	0 10 45	0 11 0	0 11 21	0 11 50	0 12 22	0 13 5	0 13 50	0 14 42	0 15 40	0 16 45	0 17 55	0 19 13	0 20 35	0 22 4

LATITUDE 12° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 49 25	0 54 14	0 59 18	1 4 38	1 10 12	1 16 2	1 22 4	1 28 22	1 34 52	1 41 33	1 48 32	1 55 41	2 3 2	2 10 5	2 18 20
1	0 52 40	0 57 52	1 3 23	1 9 8	1 15 1	1 21 18	1 27 45	1 34 31	1 41 28	1 48 42	1 56 5	2 3 43	2 11 32	2 19 36	2 27 51
2	0 56 29	1 2 9	1 8 5	1 14 15	1 20 42	1 27 27	1 34 27	1 41 42	1 49 10	1 56 56	2 4 51	2 11 56	2 21 22	2 29 56	2 38 45
3	1 1 6	1 6 14	1 13 43	1 20 39	1 27 28	1 34 45	1 42 20	1 50 9	1 58 13	2 6 35	2 14 59	2 23 46	2 32 45	2 41 59	2 51 21
4	1 6 39	1 13 25	1 20 28	1 27 45	1 35 28	1 43 24	1 51 39	2 0 6	2 8 50	2 17 45	2 26 56	2 36 23	2 45 58	2 55 50	3 5 49
5	1 13 27	1 20 55	1 28 43	1 36 49	1 45 15	1 54 1	2 2 56	2 12 1	2 21 32	2 31 16	2 41 13	2 51 19	3 1 39	3 12 8	3 22 49
6	1 21 59	1 30 25	1 39 0	1 48 2	1 57 19	2 6 55	2 14 10	2 26 41	2 36 50	2 47 35	2 58 16	3 9 9	3 20 13	3 31 31	3 42 56
7	1 33 10	1 41 34	1 51 13	2 2 11	2 14 3	2 22 52	2 33 40	2 44 42	2 55 51	3 7 15	3 18 47	3 30 34	3 42 29	3 54 34	4 6 43
8	1 47 55	1 58 39	2 9 25	2 20 22	2 31 43	2 43 26	2 55 9	3 7 6	3 19 11	3 31 30	3 44 1	3 56 36	4 9 16	4 22 2	4 35 4
9	2 7 56	2 19 47	2 31 48	2 44 6	2 56 42	3 9 25	3 22 4	3 35 2	3 48 10	4 1 29	4 14 41	4 28 2	4 41 35	4 55 8	5 8 45
10	2 35 32	2 48 46	3 2 13	3 15 35	3 29 3	3 42 46	3 56 43	4 10 27	4 24 18	4 38 20	4 52 0	5 6 25	5 20 31	5 34 45	5 48 54
11	3 13 45	3 28 19	3 42 34	3 56 48	4 11 14	4 25 44	4 40 3	4 54 35	5 9 2	5 23 31	5 37 59	5 52 37	6 7 5	6 21 38	6 36 17
12	Not calculable.														
13	3 12 52	3 27 24	3 41 33	3 55 48	4 10 7	4 24 29	4 38 50	4 53 20	5 7 44	5 22 4	5 36 40	5 41 2	6 5 35	6 20 2	6 34 35
14	2 33 54	2 47 1	3 0 18	3 13 40	3 26 43	3 40 48	3 54 22	4 7 58	4 21 49	4 35 44	4 49 44	5 3 37	5 17 36	5 31 43	5 45 43
15	2 5 48	2 17 36	2 29 25	2 41 36	2 53 52	3 6 23	3 18 59	3 31 45	3 44 44	3 57 44	4 10 54	4 24 2	4 37 21	4 50 50	5 4 12
16	1 45 33	1 55 49	2 6 33	2 17 9	2 28 24	2 39 43	2 51 20	3 3 1	3 14 50	3 26 59	3 39 11	3 51 34	4 3 58	4 16 53	4 29 19
17	1 30 33	1 39 42	1 48 58	1 58 43	2 8 40	2 18 51	2 29 18	2 40 1	2 50 52	3 2 4	3 13 16	3 24 43	3 36 18	3 48 5	3 59 57
18	1 19 14	1 27 20	1 35 36	1 44 18	1 53 6	2 2 30	2 11 47	2 21 36	2 31 31	2 41 44	2 52 2	3 2 40	3 13 18	3 24 14	3 35 18
19	1 10 32	1 17 38	1 25 8	1 32 49	1 40 50	1 49 16	1 57 46	2 6 40	2 15 40	2 25 0	2 34 32	2 44 13	2 54 9	3 4 14	3 14 33
20	1 3 36	1 10 0	1 16 41	1 23 37	1 30 54	1 38 34	1 46 18	1 54 21	2 2 30	2 11 10	2 19 55	2 28 50	2 38 0	2 47 25	2 56 56
21	0 57 56	1 3 47	1 9 50	1 16 7	1 22 44	1 29 38	1 36 45	1 44 11	1 51 45	1 59 35	2 7 42	2 15 54	2 24 23	2 33 1	2 41 57
22	0 53 20	0 58 40	1 4 7	1 9 53	1 15 54	1 22 14	1 28 45	1 35 33	1 42 33	1 49 46	1 57 14	2 4 53	2 12 41	2 20 44	2 29 2
23	0 49 29	0 54 22	0 59 20	1 4 38	1 10 11	1 15 56	1 21 58	1 28 14	1 34 43	1 41 24	1 48 17	1 55 24	2 2 41	2 10 10	2 17 50

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 49 25	0 54 14	0 59 18	1 4 38	1 10 12	1 16 2	1 22 4	1 28 22	1 34 52	1 41 33	1 48 32	1 55 41	2 3 2	2 10 5	2 18 20
1	0 46 47	0 51 15	0 55 58	1 0 51	1 6 4	1 11 31	1 17 10	1 23 3	1 29 8	1 35 25	1 41 54	1 48 37	1 55 34	2 2 42	2 10 1
2	0 44 22	0 48 33	0 52 57	0 57 31	1 2 25	1 7 32	1 12 50	1 18 21	1 24 4	1 29 56	1 36 5	1 42 25	1 48 57	1 55 42	2 2 38
3	0 42 11	0 46 7	0 50 14	0 54 34	0 59 10	1 3 59	1 8 58	1 14 10	1 19 33	1 25 9	1 30 55	1 36 55	1 43 7	1 49 32	1 56 4
4	0 40 13	0 43 56	0 47 49	0 51 56	0 56 16	1 0 49	1 5 31	1 10 26	1 15 31	1 20 47	1 26 18	1 32 0	1 37 49	1 43 47	1 50 6
5	0 38 28	0 42 0	0 45 41	0 49 35	0 53 41	0 58 0	1 2 26	1 7 5	1 11 54	1 16 58	1 22 11	1 27 34	1 33 8	1 38 51	1 44 46
6	0 37 0	0 40 21	0 43 50	0 47 29	0 51 22	0 55 27	0 59 38	1 4 3	1 8 38	1 13 30	1 18 27	1 23 33	1 28 51	1 34 20	1 39 59
7	0 35 39	0 38 50	0 42 9	0 45 34	0 49 15	0 53 7	0 57 6	1 1 18	1 5 40	1 10 21	1 15 3	1 19 57	1 25 0	1 30 14	1 35 34
8	0 34 24	0 37 26	0 40 36	0 43 50	0 47 20	0 51 1	0 54 49	0 58 49	1 2 59	1 7 29	1 12 0	1 16 37	1 21 27	1 26 26	1 31 35
9	0 33 15	0 36 8	0 39 10	0 42 17	0 45 37	0 49 8	0 52 47	0 56 36	1 0 35	1 4 51	1 9 21	1 13 35	1 18 12	1 22 59	1 27 54
10	0 32 12	0 34 56	0 37 51	0 40 53	0 44 4	0 47 26	0 50 58	0 54 37	0 58 26	1 2 26	1 6 27	1 10 50	1 15 14	1 19 48	1 24 31
11	0 31 14	0 33 50	0 36 38	0 39 36	0 42 38	0 45 52	0 49 16	0 52 45	0 56 25	1 0 14	1 4 6	1 8 17	1 12 29	1 16 54	1 21 25
12	0 30 21	0 32 50	0 35 31	0 38 24	0 41 18	0 44 24	0 47 40	0 51 0	0 54 32	0 58 10	1 1 54	1 5 53	1 9 55	1 14 11	1 18 31
13	0 29 32	0 31 55	0 34 29	0 37 15	0 40 2	0 43 1	0 46 9	0 49 21	0 52 45	0 56 14	0 59 51	1 3 39	1 7 32	1 11 39	1 15 49
14	0 28 47	0 31 5	0 33 32	0 36 10	0 38 51	0 41 43	0 44 43	0 47 48	0 51 4	0 54 26	0 57 56	1 1 33	1 5 18	1 9 17	1 13 17
15	0 28 5	0 30 19	0 32 39	0 35 9	0 37 45	0 40 30	0 43 23	0 46 22	0 49 30	0 52 45	0 56 9	0 59 39	1 3 17	1 7 4	1 10 54
16	0 27 25	0 29 34	0 31 49	0 34 12	0 36 43	0 39 22	0 42 9	0 45 2	0 48 3	0 51 10	0 54 27	0 57 48	1 1 19	1 4 58	1 8 41
17	0 26 47	0 28 52	0 31 3	0 33 19	0 35 45	0 38 19	0 41 0	0 43 47	0 46 42	0 49 41	0 52 51	0 56 4	0 59 28	1 2 0	1 6 36
18	0 26 11	0 28 12	0 30 19	0 32 30	0 34 51	0 37 20	0 39 55	0 42 37	0 45 26	0 48 18	0 51 22	0 54 28	0 57 45	1 0 9	1 4 38
19	0 25 37	0 27 34	0 29 37	0 31 44	0 34 0	0 36 24	0 38 53	0 41 30	0 44 13	0 47 0	0 49 58	0 52 58	0 56 8	0 58 25	1 2 47
20	0 25 5	0 26 58	0 28 57	0 31 0	0 33 12	0 35 31	0 37 54	0 40 26	0 43 3	0 45 46	0 48 38	0 51 33	0 54 37	0 57 47	1 1 3
21	0 24 35	0 26 24	0 28 19	0 30 18	0 32 26	0 34 40	0 36 59	0 39 25	0 41 58	0 44 36	0 47 22	0 50 12	0 53 10	0 56 14	0 59 21
22	0 24 7	0 25 52	0 27 43	0 29 38	0 31 42	0 33 51	0 36 6	0 38 26	0 40 55	0 43 28	0 46 10	0 48 54	0 51 46	0 54 45	0 57 42
23	0 23 39	0 25 21	0 27 7	0 29 0	0 30 59	0 33 4	0 35 15	0 37 30	0 39 55	0 42 23	0 45 0	0 47 39	0 50 25	0 53 18	0 56 5

LATITUDE 12° NORTH OR SOUTH.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	2 26 17	2 34 24	2 42 44	2 51 13	2 59 49	3 8 39	3 17 37	3 26 44	3 36 2	3 45 27	3 55 0	4 4 42	4 14 32	4 24 28	4 34 33
1	2 17 31	2 25 10	2 33 4	2 41 6	2 49 17	2 57 40	3 6 9	3 14 49	3 23 39	3 32 39	3 41 46	3 51 1	4 0 25	4 9 53	4 19 34
2	2 9 42	2 16 54	2 24 24	2 32 0	2 39 46	2 47 43	2 55 51	3 4 5	3 12 28	3 21 3	3 29 45	3 38 35	3 47 34	3 56 39	4 5 53
3	2 2 46	2 9 38	2 16 45	2 23 57	2 31 21	2 38 55	2 46 40	2 54 37	3 2 33	3 10 42	3 18 58	3 27 23	3 35 56	3 44 40	3 53 29
4	1 56 28	2 3 2	2 9 47	2 16 37	2 23 40	2 30 51	2 38 14	2 45 45	2 53 25	3 1 13	3 9 9	3 17 13	3 25 26	3 33 47	3 42 18
5	1 50 50	1 57 5	2 3 31	2 10 4	2 16 48	2 23 38	2 30 39	2 37 51	2 45 10	2 52 38	3 0 15	3 7 59	3 15 52	3 23 51	3 32 0
6	1 45 46	1 51 43	1 57 49	2 4 7	2 10 32	2 17 3	2 23 45	2 30 38	2 37 38	2 44 46	2 52 5	2 59 29	3 7 3	3 14 41	3 22 31
7	1 41 5	1 46 47	1 52 37	1 58 38	2 4 46	2 11 1	2 17 26	2 24 2	2 30 44	2 37 35	2 44 36	2 51 43	2 58 57	3 6 18	3 13 49
8	1 36 51	1 42 18	1 47 53	1 53 38	1 59 30	2 5 30	2 11 39	2 17 59	2 24 24	2 30 58	2 37 41	2 44 32	2 51 30	2 58 35	3 5 48
9	1 32 56	1 38 9	1 43 33	1 49 3	1 54 41	2 0 27	2 6 22	2 12 24	2 18 34	2 24 53	2 31 20	2 37 55	2 44 37	2 51 27	2 58 24
10	1 29 21	1 34 21	1 39 31	1 44 46	1 50 12	1 55 45	2 1 26	2 7 14	2 13 10	2 19 14	2 25 26	2 31 45	2 38 12	2 44 47	2 51 29
11	1 26 4	1 30 51	1 35 49	1 40 53	1 46 5	1 51 25	1 56 53	2 2 27	2 8 10	2 14 1	2 19 59	2 26 4	2 32 14	2 38 34	2 45 2
12	1 22 59	1 27 34	1 32 19	1 37 13	1 42 12	1 47 20	1 52 36	1 57 58	2 3 29	2 9 7	2 14 51	2 20 42	2 26 42	2 32 48	2 39 3
13	1 20 6	1 24 31	1 29 5	1 33 47	1 38 35	1 43 31	1 48 35	1 53 46	1 59 4	2 4 31	2 10 5	2 15 44	2 21 31	2 27 23	2 33 25
14	1 17 25	1 21 40	1 26 4	1 30 35	1 35 13	1 39 58	1 44 52	1 49 53	1 54 59	2 0 15	2 5 38	2 11 6	2 16 41	2 22 19	2 28 9
15	1 14 55	1 19 1	1 23 16	1 27 37	1 32 6	1 36 41	1 41 25	1 46 17	1 51 12	1 56 17	2 1 26	2 6 43	2 12 7	2 17 35	2 23 13
16	1 12 35	1 16 32	1 20 38	1 24 50	1 29 10	1 33 36	1 38 9	1 42 51	1 47 36	1 52 30	1 57 28	2 2 35	2 7 49	2 13 7	2 18 34
17	1 10 23	1 14 12	1 18 9	1 22 13	1 26 24	1 30 42	1 35 5	1 39 38	1 44 14	1 48 58	1 53 46	1 58 43	2 3 46	2 8 55	2 14 11
18	1 8 18	1 12 0	1 15 48	1 19 44	1 23 47	1 27 57	1 32 11	1 36 35	1 41 2	1 45 37	1 50 16	1 55 4	1 59 56	2 4 56	2 10 2
19	1 6 19	1 9 54	1 13 34	1 17 23	1 21 18	1 25 20	1 29 26	1 33 41	1 38 0	1 42 26	1 46 57	1 51 36	1 56 18	2 1 9	2 6 5
20	1 4 25	1 7 54	1 11 27	1 15 9	1 18 56	1 22 50	1 26 49	1 30 55	1 35 6	1 39 23	1 43 47	1 48 17	1 52 51	1 57 33	2 2 19
21	1 2 35	1 5 58	1 9 24	1 12 59	1 16 38	1 20 25	1 24 17	1 28 15	1 32 19	1 36 28	1 40 43	1 45 4	1 49 29	1 54 2	1 58 39
22	1 0 49	1 4 5	1 7 25	1 10 53	1 14 25	1 18 4	1 21 48	1 25 38	1 29 35	1 33 37	1 37 43	1 41 56	1 46 13	1 50 37	1 55 5
23	0 59 7	1 2 15	1 5 29	1 8 51	1 12 15	1 15 47	1 19 23	1 23 5	1 26 55	1 30 49	1 34 47	1 38 52	1 43 1	1 47 17	1 51 38

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	4 44 46	4 55 5	5 5 32	5 16 5	5 26 42	5 37 29	5 48 20	5 59 16	6 10 18	6 21 28	6 32 40	6 44 0	6 55 23	7 6 51	7 18 25
1	4 29 21	4 39 14	4 49 15	4 59 24	5 9 36	5 19 57	5 30 22	5 40 57	5 51 35	6 2 19	6 13 8	6 24 5	6 35 5	6 46 11	6 57 22
2	4 15 15	4 24 44	4 34 20	4 44 5	4 53 54	5 3 51	5 13 52	5 24 6	5 34 21	5 44 41	5 55 8	6 5 42	6 16 20	6 27 5	6 37 54
3	4 2 27	4 11 33	4 20 46	4 30 7	4 39 33	4 49 6	4 58 46	5 8 37	5 18 30	5 28 28	5 38 33	5 48 46	5 59 3	6 9 26	6 19 55
4	3 50 53	3 59 37	4 8 28	4 17 27	4 26 32	4 35 44	4 45 4	4 54 29	5 4 1	5 13 38	5 23 23	5 33 15	5 43 11	5 53 12	6 3 21
5	3 40 17	3 48 40	3 57 9	4 5 47	4 14 31	4 23 22	4 32 21	4 41 26	4 50 38	4 59 55	5 9 19	5 18 50	5 28 25	5 38 7	5 47 55
6	3 30 28	3 38 31	3 46 43	3 55 2	4 3 26	4 11 57	4 20 35	4 29 22	4 38 15	4 47 13	4 56 17	5 5 28	5 14 43	5 24 7	5 33 34
7	3 21 26	3 29 13	3 37 6	3 45 6	3 53 12	4 1 25	4 9 44	4 18 12	4 26 45	4 35 25	4 44 10	4 53 2	5 2 0	5 11 5	5 20 14
8	3 13 5	3 20 36	3 28 10	3 35 52	3 43 41	3 51 38	3 59 40	4 7 50	4 16 4	4 24 27	4 32 55	4 41 29	4 50 10	4 58 57	5 7 49
9	3 5 27	3 12 40	3 19 55	3 27 20	3 34 53	3 42 33	3 50 17	3 58 11	4 6 9	4 14 15	4 22 25	4 30 42	4 39 6	4 47 35	4 56 10
10	2 58 18	3 5 14	3 12 15	3 19 24	3 26 41	3 34 5	3 41 31	3 49 11	3 56 54	4 4 43	4 12 36	4 20 37	4 28 44	4 36 57	4 45 15
11	2 51 38	2 58 19	3 5 6	3 12 0	3 19 2	3 26 10	3 33 22	3 40 45	3 48 13	3 55 46	4 3 23	4 11 9	4 19 1	4 26 57	4 35 0
12	2 45 24	2 51 50	2 58 24	3 5 5	3 11 52	3 18 44	3 25 44	3 32 51	3 40 4	3 47 23	3 54 46	4 2 18	4 9 56	4 17 35	4 25 24
13	2 39 33	2 45 47	2 52 8	2 58 35	3 5 9	3 11 48	3 18 34	3 25 27	3 32 26	3 39 32	3 46 41	3 53 59	4 1 23	4 8 50	4 16 24
14	2 34 5	2 40 6	2 46 15	2 52 29	2 58 51	3 5 17	3 11 50	3 18 29	3 25 15	3 32 8	3 39 4	3 46 7	3 53 17	4 0 31	4 7 51
15	2 28 57	2 34 46	2 40 43	2 46 44	2 52 54	2 59 8	3 5 28	3 11 54	3 18 27	3 25 6	3 31 50	3 38 39	3 45 36	3 52 37	3 59 44
16	2 24 7	2 29 45	2 35 30	2 41 20	2 47 18	2 53 20	2 59 28	3 5 42	3 12 2	3 18 28	3 24 59	3 31 35	3 38 19	3 45 7	3 52 1
17	2 19 34	2 25 1	2 30 35	2 36 14	2 42 1	2 47 52	2 53 49	2 59 51	3 5 59	3 12 13	3 18 32	3 24 56	3 31 28	3 38 4	3 44 46
18	2 15 15	2 20 32	2 25 55	2 31 24	2 37 1	2 42 41	2 48 27	2 54 18	3 0 15	3 6 18	3 12 26	3 18 39	3 24 59	3 31 24	3 37 54
19	2 11 8	2 16 15	2 21 28	2 26 47	2 32 14	2 37 44	2 43 20	2 49 1	2 54 47	3 0 40	3 6 38	3 12 40	3 18 49	3 25 3	3 31 22
20	2 7 12	2 12 10	2 17 13	2 22 22	2 27 39	2 32 59	2 38 25	2 43 57	2 49 33	2 55 17	3 1 6	3 6 58	3 12 56	3 19 0	3 25 8
21	2 3 23	2 8 12	2 13 6	2 18 6	2 23 13	2 28 23	2 33 39	2 39 1	2 44 27	2 50 1	2 55 40	3 1 22	3 7 10	3 13 3	3 19 1
22	1 59 40	2 4 20	2 9 6	2 13 57	2 18 54	2 23 55	2 29 1	2 34 13	2 39 30	2 44 53	2 50 22	2 55 54	3 1 32	3 7 14	3 13 2
23	1 56 4	2 0 35	2 5 12	2 9 54	2 14 41	2 19 33	2 24 30	2 29 33	2 34 41	2 39 54	2 45 11	2 50 34	2 56 1	3 1 33	3 7 12

LATITUDE 13° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 11 9	0 11 35	0 12 17	0 13 17	0 14 33	0 16 7	0 17 57	0 20 3	0 22 25	0 25 5	0 27 57	0 31 11	0 34 37	0 38 19	0 42 16
1	0 11 13	0 11 38	0 12 24	0 13 28	0 14 49	0 16 32	0 18 29	0 20 44	0 23 21	0 26 12	0 29 22	0 32 45	0 36 30	0 40 28	0 44 44
2	0 11 15	0 11 42	0 12 33	0 13 41	0 15 14	0 17 4	0 19 12	0 21 37	0 24 26	0 27 33	0 30 56	0 34 39	0 38 41	0 42 58	0 47 36
3	0 11 17	0 11 46	0 12 41	0 13 56	0 15 39	0 17 37	0 19 55	0 22 38	0 25 42	0 29 9	0 32 51	0 36 52	0 41 17	0 45 57	0 50 58
4	0 11 19	0 11 52	0 12 52	0 14 19	0 16 13	0 18 24	0 20 53	0 23 53	0 27 19	0 31 6	0 35 10	0 39 36	0 44 27	0 49 35	0 55 3
5	0 11 23	0 11 58	0 13 10	0 14 41	0 16 48	0 19 18	0 22 13	0 25 29	0 29 15	0 33 37	0 37 56	0 42 53	0 48 15	0 53 58	0 59 58
6	0 11 26	0 12 13	0 13 27	0 15 16	0 17 38	0 20 24	0 23 39	0 27 27	0 31 43	0 36 26	0 41 31	0 47 1	0 53 4	0 59 24	1 6 5
7	0 11 30	0 12 22	0 13 47	0 15 53	0 18 40	0 21 49	0 25 40	0 29 57	0 34 54	0 40 14	0 46 3	0 52 24	0 59 10	1 6 16	1 13 44
8	0 11 32	0 12 37	0 14 23	0 16 45	0 20 10	0 23 50	0 28 25	0 33 30	0 39 19	0 45 30	0 52 14	0 59 32	1 7 21	1 15 25	1 23 55
9	0 11 38	0 12 55	0 15 13	0 18 13	0 22 16	0 26 49	0 32 21	0 38 27	0 45 18	0 52 42	1 0 43	1 9 10	1 18 0	1 27 31	1 37 17
10	0 11 44	0 13 36	0 16 25	0 20 25	0 25 36	0 31 36	0 38 30	0 46 1	0 54 33	1 3 42	1 12 56	1 22 58	1 33 44	1 44 37	1 55 44
11	0 12 13	0 14 42	0 18 50	0 24 37	0 31 47	0 39 54	0 49 3	0 58 54	1 9 42	1 20 43	1 32 13	1 44 13	1 56 40	2 9 2	2 21 45
12	0 12 50	0 17 50	0 25 20	0 34 50	0 45 50	0 57 45	1 9 54	1 22 43	1 36 14	1 49 28	2 3 4	2 16 44	2 30 44	2 44 51	2 58 54
13	Not calculable.														
14	0 12 50	0 17 50	0 25 20	0 34 45	0 45 50	0 57 14	1 9 38	1 22 17	1 35 33	1 48 55	2 2 28	2 16 0	2 30 3	2 43 57	2 58 3
15	0 12 13	0 14 37	0 18 44	0 24 32	0 31 37	0 39 32	0 48 37	0 58 13	1 9 3	1 19 43	1 31 13	1 42 59	1 55 13	2 7 45	2 20 15
16	0 11 44	0 13 30	0 16 18	0 20 14	0 25 14	0 31 1	0 37 49	0 45 22	0 53 44	1 2 25	1 11 44	1 21 39	1 32 0	1 42 43	1 53 44
17	0 11 38	0 12 49	0 14 57	0 17 52	0 21 47	0 26 27	0 31 40	0 37 38	0 44 21	0 51 36	0 59 13	1 7 33	1 16 15	1 25 29	1 34 51
18	0 11 32	0 12 32	0 14 14	0 16 37	0 19 40	0 23 25	0 27 41	0 32 37	0 38 16	0 44 4	0 50 41	0 57 39	1 5 12	1 12 52	1 21 15
19	0 11 28	0 12 18	0 13 41	0 15 40	0 18 20	0 21 22	0 24 57	0 29 3	0 33 49	0 38 56	0 44 30	0 50 32	0 56 59	1 3 53	1 11 7
20	0 11 22	0 12 4	0 13 19	0 14 56	0 17 16	0 19 49	0 22 58	0 26 34	0 30 34	0 34 59	0 39 54	0 45 7	0 50 49	0 56 52	1 3 11
21	0 11 20	0 11 54	0 12 58	0 14 30	0 16 26	0 18 45	0 21 29	0 24 36	0 28 11	0 32 0	0 36 20	0 40 57	0 46 2	0 51 21	0 57 2
22	0 11 17	0 11 48	0 12 45	0 14 6	0 15 45	0 17 50	0 20 15	0 23 0	0 26 15	0 29 40	0 33 30	0 37 38	0 42 9	0 46 57	0 52 3
23	0 11 15	0 11 44	0 12 35	0 13 44	0 15 17	0 17 7	0 19 18	0 21 45	0 24 38	0 27 43	0 31 10	0 34 53	0 39 0	0 43 22	0 47 56

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 11 9	0 11 35	0 12 17	0 13 17	0 14 33	0 16 7	0 17 57	0 20 3	0 22 25	0 25 5	0 27 57	0 31 11	0 34 37	0 38 19	0 42 16
1	0 11 7	0 11 32	0 12 11	0 13 8	0 14 20	0 15 46	0 17 30	0 19 25	0 21 38	0 24 6	0 26 47	0 29 48	0 33 1	0 36 28	0 40 11
2	0 11 6	0 11 29	0 12 5	0 12 59	0 14 7	0 15 26	0 17 4	0 18 51	0 20 56	0 23 14	0 25 45	0 28 34	0 31 35	0 34 49	0 38 19
3	0 11 5	0 11 26	0 11 59	0 12 50	0 13 54	0 15 8	0 16 40	0 18 20	0 20 18	0 22 28	0 24 50	0 27 28	0 30 19	0 33 21	0 36 39
4	0 11 4	0 11 23	0 11 54	0 12 41	0 13 42	0 14 52	0 16 18	0 17 52	0 19 44	0 21 47	0 24 1	0 26 29	0 29 11	0 32 3	0 35 9
5	0 11 3	0 11 21	0 11 49	0 12 33	0 13 30	0 14 37	0 15 58	0 17 27	0 19 13	0 21 10	0 23 17	0 25 36	0 28 10	0 30 53	0 33 48
6	0 11 2	0 11 18	0 11 45	0 12 27	0 13 22	0 14 23	0 15 40	0 17 5	0 18 45	0 20 37	0 22 37	0 24 48	0 27 14	0 29 48	0 32 35
7	0 11 1	0 11 16	0 11 41	0 12 21	0 13 14	0 14 11	0 15 24	0 16 45	0 18 20	0 20 7	0 22 1	0 24 5	0 26 24	0 28 50	0 31 29
8	0 10 59	0 11 14	0 11 38	0 12 16	0 13 6	0 14 0	0 15 9	0 16 27	0 17 57	0 19 39	0 21 28	0 23 27	0 25 39	0 27 58	0 30 29
9	0 10 57	0 11 12	0 11 35	0 12 11	0 12 58	0 13 50	0 14 56	0 16 11	0 17 37	0 19 14	0 20 58	0 22 52	0 24 59	0 27 12	0 29 35
10	0 10 55	0 11 10	0 11 32	0 12 6	0 12 50	0 13 41	0 14 44	0 15 57	0 17 19	0 18 51	0 20 30	0 22 20	0 24 22	0 26 29	0 28 45
11	0 10 53	0 11 7	0 11 29	0 12 2	0 12 43	0 13 33	0 14 33	0 15 43	0 17 2	0 18 29	0 20 4	0 21 50	0 23 47	0 25 48	0 27 59
12	0 10 51	0 11 5	0 11 26	0 11 58	0 12 37	0 13 25	0 14 23	0 15 30	0 16 46	0 18 9	0 19 40	0 21 22	0 23 14	0 25 10	0 27 16
13	0 10 49	0 11 3	0 11 23	0 11 54	0 12 31	0 13 18	0 14 14	0 15 17	0 16 31	0 17 50	0 19 17	0 20 56	0 22 43	0 24 35	0 26 36
14	0 10 48	0 11 1	0 11 20	0 11 50	0 12 26	0 13 11	0 14 5	0 15 5	0 16 16	0 17 32	0 18 56	0 20 31	0 22 14	0 24 2	0 25 58
15	0 10 47	0 10 59	0 11 18	0 11 46	0 12 21	0 13 4	0 13 56	0 14 53	0 16 2	0 17 15	0 18 36	0 20 7	0 21 46	0 23 31	0 25 23
16	0 10 46	0 10 57	0 11 15	0 11 42	0 12 16	0 12 57	0 13 47	0 14 42	0 15 48	0 16 59	0 18 17	0 19 43	0 21 19	0 23 1	0 24 50
17	0 10 45	0 10 55	0 11 12	0 11 38	0 12 11	0 12 51	0 13 39	0 14 32	0 15 35	0 16 44	0 17 59	0 19 22	0 20 55	0 22 33	0 24 19
18	0 10 43	0 10 53	0 11 9	0 11 34	0 12 6	0 12 45	0 13 31	0 14 23	0 15 23	0 16 30	0 17 43	0 19 3	0 20 33	0 22 7	0 23 49
19	0 10 41	0 10 51	0 11 7	0 11 30	0 12 2	0 12 39	0 13 23	0 14 14	0 15 12	0 16 17	0 17 28	0 18 45	0 20 12	0 21 43	0 23 21
20	0 10 39	0 10 49	0 11 5	0 11 27	0 11 58	0 12 33	0 13 16	0 14 6	0 15 2	0 16 5	0 17 14	0 18 28	0 19 52	0 21 21	0 22 55
21	0 10 38	0 10 47	0 11 2	0 11 24	0 11 54	0 12 28	0 13 9	0 13 58	0 14 52	0 15 53	0 17 0	0 18 12	0 19 33	0 20 59	0 22 30
22	0 10 36	0 10 45	0 11 0	0 11 21	0 11 50	0 12 23	0 13 3	0 13 50	0 14 43	0 15 41	0 16 46	0 17 56	0 19 15	0 20 38	0 22 6
23	0 10 34	0 10 43	0 10 58	0 11 18	0 11 46	0 12 18	0 12 57	0 13 42	0 14 34	0 15 29	0 16 32	0 17 41	0 18 57	0 20 17	0 21 43

LATITUDE 13° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 46 28	0 50 58	0 55 40	1 0 36	1 5 48	1 11 12	1 16 49	1 22 42	1 28 47	1 35 4	1 41 34	1 48 17	1 55 10	2 2 17	2 9 34
1	0 49 15	0 54 5	0 59 5	1 4 24	1 9 59	1 15 45	1 21 45	1 27 58	1 34 29	1 41 12	1 48 9	1 55 15	2 2 35	2 10 7	2 17 48
2	0 52 30	0 57 42	1 3 6	1 8 50	1 14 45	1 21 0	1 27 27	1 34 9	1 41 5	1 48 17	1 55 41	2 3 16	2 11 3	2 19 4	2 27 17
3	0 56 17	1 1 55	1 7 47	1 13 54	1 20 23	1 27 8	1 34 0	1 41 16	1 48 43	1 56 28	2 4 7	2 12 24	2 20 45	2 29 20	2 38 5
4	1 0 50	1 6 58	1 13 23	1 20 6	1 27 3	1 34 22	1 41 50	1 49 40	1 57 42	2 6 0	2 14 26	2 23 9	2 32 6	2 41 18	2 50 34
5	1 6 20	1 13 0	1 20 3	1 27 28	1 35 1	1 42 56	1 51 8	1 59 37	2 8 15	2 17 10	2 26 20	2 35 43	2 45 16	2 55 5	3 5 0
6	1 13 8	1 20 34	1 28 24	1 36 25	1 44 45	1 53 25	2 2 24	2 11 30	2 20 50	2 30 36	2 40 31	2 50 34	3 0 47	3 11 18	3 21 57
7	1 21 40	1 29 59	1 38 36	1 48 32	1 56 45	2 6 18	2 15 58	2 25 57	2 36 16	2 46 47	2 57 25	3 8 16	3 19 18	3 30 36	3 41 54
8	1 32 52	1 42 19	1 51 52	2 1 48	2 11 55	2 22 33	2 33 13	2 44 10	2 55 19	3 6 45	3 18 14	3 29 53	3 41 48	3 53 55	4 6 0
9	1 47 22	1 57 53	2 8 46	2 19 42	2 30 56	2 42 39	2 54 20	3 6 9	3 18 14	3 30 35	3 42 55	3 55 27	4 8 7	4 20 54	4 33 45
10	2 7 14	2 19 2	2 31 2	2 43 21	2 55 48	3 8 32	3 21 13	3 34 6	3 47 6	4 0 17	4 13 35	4 26 50	4 40 15	4 53 47	5 7 26
11	2 34 45	2 47 54	3 1 15	3 14 40	3 28 2	3 41 46	3 55 40	4 9 17	4 23 1	4 37 5	4 51 0	5 5 3	5 19 0	5 33 13	5 47 22
12	3 12 52	3 27 24	3 41 33	3 55 48	4 10 7	4 24 29	4 38 50	4 53 20	5 7 44	5 22 4	5 36 40	5 41 2	6 5 35	6 20 2	6 34 35
13	Not calcula ble.														
14	3 11 54	3 26 24	3 40 30	3 54 45	4 8 58	4 23 18	4 37 43	4 51 54	5 6 20	5 20 45	5 35 2	5 49 35	6 3 54	6 18 28	6 32 49
15	2 32 59	2 46 4	2 59 26	3 12 31	3 25 55	3 39 33	3 53 2	4 6 49	4 20 28	4 34 0	4 48 5	5 2 3	5 15 51	5 29 57	5 43 55
16	2 5 0	2 16 43	2 28 32	2 40 39	2 52 47	3 5 23	3 17 47	3 30 36	3 43 21	3 56 29	4 9 25	4 22 33	4 35 43	4 49 8	5 2 28
17	1 44 47	1 55 1	2 5 41	2 16 20	2 27 22	2 38 39	2 50 7	3 1 47	3 13 34	3 25 42	3 37 43	3 50 1	4 2 24	4 14 51	4 27 34
18	1 29 52	1 38 50	1 48 15	1 57 46	2 7 42	2 17 48	2 28 16	2 38 49	2 49 40	3 0 46	3 11 51	3 23 17	3 34 45	3 46 26	3 58 17
19	1 18 36	1 26 39	1 34 50	1 43 27	1 52 18	2 1 28	2 10 54	2 20 28	2 30 20	2 40 26	2 50 44	3 1 12	3 10 47	3 22 40	3 33 43
20	1 9 56	1 17 1	1 24 22	1 32 2	1 40 1	1 48 18	1 56 50	2 5 35	2 14 30	2 23 42	2 33 13	2 42 52	2 52 42	3 2 44	3 12 55
21	1 3 2	1 9 23	1 15 56	1 22 53	1 30 8	1 37 36	1 45 21	1 53 21	2 1 34	2 10 0	2 18 43	2 27 34	2 36 39	2 45 55	2 55 26
22	0 57 29	1 3 11	1 9 12	1 15 29	1 21 57	1 28 46	1 35 53	1 43 12	1 50 42	1 58 29	2 6 32	2 14 40	2 23 1	2 31 38	2 40 30
23	0 52 52	0 58 4	1 3 35	1 9 17	1 15 14	1 21 26	1 27 54	1 34 39	1 41 35	1 48 43	1 56 5	2 3 41	2 11 27	2 19 25	2 27 34

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 46 28	0 50 58	0 55 40	1 0 36	1 5 48	1 11 12	1 16 49	1 22 42	1 28 47	1 35 4	1 41 34	1 48 17	1 55 10	2 2 17	2 9 34
1	0 44 8	0 48 23	0 52 47	0 57 25	1 2 20	1 7 17	1 12 34	1 18 5	1 23 50	1 29 42	1 35 48	1 42 7	1 48 35	1 55 17	2 2 8
2	0 42 2	0 46 3	0 50 10	0 54 31	0 59 9	1 3 47	1 8 45	1 13 56	1 19 23	1 24 53	1 30 38	1 36 36	1 42 43	1 49 3	1 55 32
3	0 40 9	0 43 55	0 47 47	0 51 53	0 56 15	1 0 39	1 5 20	1 10 14	1 15 25	1 20 35	1 26 2	1 31 41	1 37 29	1 43 30	1 49 39
4	0 38 26	0 41 59	0 45 38	0 49 31	0 53 38	0 57 51	1 2 17	1 6 56	1 11 53	1 16 45	1 21 56	1 27 18	1 32 49	1 38 33	1 44 24
5	0 36 53	0 40 14	0 43 43	0 47 25	0 51 18	0 55 21	0 59 34	1 4 0	1 8 35	1 13 21	1 18 18	1 23 25	1 28 41	1 34 10	1 39 45
6	0 35 32	0 38 43	0 42 1	0 45 32	0 49 14	0 53 5	0 57 6	1 1 17	1 5 40	1 10 13	1 14 57	1 19 50	1 24 51	1 30 5	1 35 27
7	0 34 19	0 37 21	0 40 28	0 43 50	0 47 21	0 51 1	0 54 51	0 58 49	1 3 0	1 7 21	1 11 52	1 16 32	1 21 20	1 26 20	1 31 29
8	0 33 12	0 36 5	0 39 3	0 42 16	0 45 37	0 49 8	0 52 48	0 56 35	1 0 35	1 4 44	1 9 3	1 13 31	1 18 6	1 22 53	1 27 50
9	0 32 11	0 34 56	0 37 46	0 40 50	0 44 2	0 47 25	0 50 56	0 54 33	0 58 23	1 2 21	1 6 29	1 10 45	1 15 8	1 19 43	1 24 28
10	0 31 14	0 33 52	0 36 36	0 39 31	0 42 35	0 45 50	0 49 12	0 52 42	0 56 22	1 0 10	1 4 8	1 8 13	1 12 25	1 16 48	1 21 21
11	0 30 21	0 32 52	0 35 30	0 38 18	0 41 15	0 44 22	0 47 36	0 50 57	0 54 27	0 58 7	1 1 56	1 5 52	1 9 54	1 14 8	1 18 29
12	0 29 32	0 31 57	0 34 30	0 37 11	0 40 1	0 43 0	0 46 6	0 49 20	0 52 41	0 56 12	0 59 52	1 3 40	1 7 33	1 11 38	1 15 48
13	0 28 47	0 31 6	0 33 34	0 36 8	0 38 52	0 41 43	0 44 42	0 47 49	0 51 2	0 54 25	0 57 56	1 1 36	1 5 20	1 9 17	1 13 17
14	0 28 4	0 30 18	0 32 41	0 35 9	0 37 47	0 40 31	0 43 23	0 46 24	0 49 30	0 52 46	0 56 8	0 59 40	1 3 16	1 7 5	1 10 56
15	0 27 24	0 29 33	0 31 51	0 34 13	0 36 45	0 39 24	0 42 9	0 45 4	0 48 4	0 51 14	0 54 28	0 57 52	1 1 21	1 5 2	1 8 45
16	0 26 46	0 28 51	0 31 4	0 33 20	0 35 47	0 38 21	0 41 0	0 43 48	0 46 43	0 49 47	0 52 54	0 56 10	0 59 33	1 3 6	1 6 42
17	0 26 11	0 28 12	0 30 20	0 32 31	0 34 53	0 37 21	0 39 55	0 42 37	0 45 26	0 48 24	0 51 25	0 54 35	0 57 51	1 1 16	1 4 45
18	0 25 38	0 27 35	0 29 38	0 31 45	0 34 2	0 36 25	0 38 54	0 41 30	0 44 14	0 47 6	0 50 1	0 53 5	0 56 15	0 59 32	1 2 54
19	0 25 7	0 27 0	0 28 58	0 31 2	0 33 14	0 35 32	0 37 56	0 40 27	0 43 5	0 45 51	0 48 41	0 51 39	0 54 43	0 57 53	1 1 9
20	0 24 37	0 26 26	0 28 19	0 30 21	0 32 28	0 34 42	0 37 2	0 39 28	0 42 0	0 44 40	0 47 25	0 50 17	0 53 15	0 56 19	0 59 29
21	0 24 8	0 25 54	0 27 44	0 29 42	0 31 45	0 33 54	0 36 10	0 38 32	0 40 59	0 43 33	0 46 13	0 48 59	0 51 52	0 54 50	0 57 54
22	0 23 40	0 25 23	0 27 10	0 29 4	0 31 3	0 33 8	0 35 20	0 37 38	0 40 1	0 42 29	0 45 5	0 47 46	0 50 33	0 53 26	0 56 24
23	0 23 14	0 24 54	0 26 38	0 28 28	0 30 23	0 32 24	0 34 32	0 36 46	0 39 5	0 41 29	0 44 0	0 46 36	0 49 18	0 52 6	0 54 59

LATITUDE 13° NORTH OR SOUTH.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	2 17 2	2 24 41	2 32 32	2 40 32	2 48 43	2 57 2	3 5 31	3 14 11	3 22 59	3 31 56	3 41 1	3 50 15	3 59 35	4 9 4	4 18 43
1	2 9 11	2 16 24	2 23 50	2 31 32	2 39 18	2 47 14	2 55 20	3 3 34	3 11 58	3 20 31	3 29 12	3 38 1	3 46 58	3 56 2	4 5 12
2	2 2 26	2 9 17	2 16 19	2 23 31	2 30 53	2 38 27	2 46 11	2 53 59	3 1 59	3 10 8	3 18 26	3 26 49	3 35 24	3 44 5	3 52 56
3	1 56 16	2 2 47	2 9 30	2 16 18	2 23 18	2 30 30	2 37 53	2 45 22	2 53 0	3 0 47	3 8 44	3 16 47	3 24 59	3 33 19	3 41 55
4	1 50 37	1 56 50	2 3 16	2 9 48	2 16 28	2 23 19	2 30 21	2 37 31	2 44 48	2 52 14	2 59 50	3 7 33	3 15 24	3 23 23	3 31 30
5	1 45 29	1 51 25	1 57 33	2 3 51	2 10 14	2 16 47	2 23 31	2 30 21	2 37 21	2 44 28	2 51 45	2 59 8	3 6 40	3 14 20	3 22 8
6	1 40 57	1 46 36	1 52 27	1 58 27	2 4 34	2 10 49	2 17 15	2 23 47	2 30 30	2 37 19	2 44 19	2 51 25	2 58 39	3 6 1	3 13 30
7	1 36 53	1 42 17	1 47 53	1 53 35	1 59 27	2 5 28	2 11 39	2 17 53	2 24 20	2 30 54	2 37 37	2 44 27	2 51 23	2 58 29	3 5 35
8	1 33 3	1 38 16	1 43 38	1 49 7	1 54 45	2 0 32	2 6 29	2 12 29	2 18 41	2 25 1	2 31 28	2 38 2	2 44 44	2 51 34	2 58 33
9	1 29 25	1 34 25	1 39 34	1 44 50	1 50 14	1 55 48	2 1 30	2 7 19	2 13 16	2 19 21	2 25 33	2 31 52	2 38 19	2 45 53	2 51 19
10	1 25 59	1 30 47	1 35 44	1 40 47	1 45 58	1 51 19	1 56 47	2 2 21	2 8 5	2 13 55	2 19 52	2 25 57	2 32 10	2 38 29	2 44 56
11	1 22 54	1 27 28	1 32 13	1 37 5	1 42 3	1 47 11	1 52 26	1 57 47	2 3 18	2 8 55	2 14 40	2 20 32	2 26 33	2 32 40	2 38 54
12	1 20 3	1 24 25	1 29 0	1 33 41	1 38 27	1 43 23	1 48 26	1 53 36	1 58 54	2 4 19	2 9 52	2 15 32	2 21 21	2 27 16	2 33 18
13	1 17 24	1 21 36	1 26 2	1 30 33	1 35 9	1 39 54	1 44 46	1 49 46	1 54 52	2 0 6	2 5 27	2 10 56	2 16 33	2 22 16	2 28 6
14	1 14 55	1 18 58	1 23 16	1 27 38	1 32 5	1 36 40	1 41 22	1 46 13	1 51 8	1 56 12	2 1 22	2 6 40	2 12 5	2 17 36	2 23 14
15	1 12 35	1 16 30	1 20 40	1 24 54	1 29 13	1 33 39	1 38 13	1 42 55	1 47 40	1 52 35	1 57 34	2 2 41	2 7 54	2 13 13	2 18 39
16	1 10 24	1 14 11	1 18 13	1 22 18	1 26 29	1 30 46	1 35 11	1 39 43	1 44 21	1 49 6	1 53 55	1 58 53	2 3 56	2 9 4	2 14 20
17	1 8 20	1 12 0	1 15 54	1 19 51	1 23 54	1 28 2	1 32 18	1 36 41	1 41 10	1 45 47	1 50 26	1 55 15	2 0 9	2 5 7	2 10 13
18	1 6 23	1 9 56	1 13 42	1 17 31	1 21 26	1 25 26	1 29 33	1 33 48	1 38 7	1 42 37	1 47 7	1 51 47	1 56 32	2 1 21	2 6 18
19	1 4 32	1 7 59	1 11 36	1 15 18	1 19 5	1 22 58	1 26 57	1 31 4	1 35 14	1 39 36	1 43 58	1 48 29	1 53 5	1 57 46	2 2 34
20	1 2 46	1 6 7	1 9 36	1 13 11	1 16 51	1 20 38	1 24 29	1 28 28	1 32 29	1 36 44	1 40 59	1 45 21	1 49 48	1 54 21	1 59 1
21	1 1 5	1 4 20	1 7 42	1 11 11	1 14 44	1 18 24	1 22 8	1 26 0	1 29 55	1 34 1	1 38 9	1 42 23	1 46 41	1 51 6	1 55 38
22	0 59 29	1 2 39	1 5 54	1 9 17	1 12 43	1 16 16	1 19 53	1 23 38	1 27 28	1 31 25	1 35 27	1 39 33	1 43 44	1 48 1	1 52 25
23	0 57 58	1 1 2	1 4 12	1 7 29	1 10 49	1 14 15	1 17 47	1 21 25	1 25 9	1 28 57	1 32 51	1 36 50	1 40 55	1 45 5	1 49 21

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	4 28 27	4 38 19	4 48 19	4 58 24	5 8 35	5 18 54	5 29 19	5 39 51	5 50 26	6 1 11	6 11 58	6 22 53	6 33 51	6 44 56	6 56 5
1	4 14 33	4 24 0	4 33 35	4 43 16	4 53 3	5 2 59	5 13 1	5 23 10	5 33 22	5 43 43	5 54 9	6 4 42	6 15 18	6 26 1	6 36 49
2	4 1 54	4 10 58	4 20 9	4 29 27	4 38 52	4 48 26	4 58 5	5 7 52	5 17 42	5 27 40	5 37 45	5 47 56	5 58 11	6 8 32	6 18 58
3	3 50 31	3 59 14	4 7 57	4 16 55	4 25 54	4 35 5	4 44 23	4 53 49	5 3 19	5 12 56	5 22 42	5 32 30	5 42 23	5 52 24	6 2 29
4	3 39 45	3 48 8	3 56 37	4 5 16	4 13 57	4 22 46	4 31 44	4 40 50	4 50 0	4 59 17	5 8 45	5 18 11	5 27 43	5 37 24	5 47 10
5	3 30 4	3 38 8	3 46 18	3 54 37	4 2 59	4 11 30	4 20 8	4 28 54	4 37 45	4 46 42	4 55 48	5 4 58	5 14 11	5 24 33	5 33 0
6	3 21 7	3 28 52	3 36 43	3 44 43	3 52 47	4 1 1	4 9 20	4 17 46	4 26 19	4 34 57	4 43 42	4 52 36	5 1 32	5 10 35	5 19 44
7	3 13 3	3 20 30	3 28 6	3 35 49	3 43 37	3 51 33	3 59 35	4 7 45	4 16 0	4 24 21	4 32 48	4 41 25	4 50 4	4 58 49	5 7 41
8	3 5 37	3 12 46	3 20 7	3 27 33	3 35 5	3 42 45	3 50 31	3 58 25	4 6 23	4 14 27	4 22 38	4 30 58	4 39 21	4 47 50	4 56 26
9	2 58 25	3 5 19	3 13 23	3 19 33	3 27 53	3 34 12	3 41 43	3 49 21	3 57 3	4 5 51	4 13 45	4 20 47	4 28 55	4 37 4	4 45 25
10	2 51 31	2 58 11	3 4 58	3 11 53	3 19 3	3 26 2	3 33 12	3 40 34	3 48 2	3 55 36	4 3 13	4 10 58	4 18 51	4 26 40	4 34 46
11	2 45 16	2 51 44	2 58 19	3 5 0	3 11 55	3 18 43	3 25 41	3 32 50	3 40 3	3 47 23	3 54 46	4 2 18	4 9 54	4 17 32	4 25 24
12	2 39 27	2 45 43	2 52 6	2 58 34	3 5 14	3 11 51	3 18 35	3 25 31	3 32 29	3 39 36	3 46 45	3 54 4	4 1 24	4 8 51	4 16 29
13	2 34 3	2 40 7	2 46 16	2 52 31	2 58 56	3 5 22	3 11 53	3 18 36	3 25 20	3 32 14	3 39 9	3 46 15	3 53 20	4 0 36	4 8 1
14	2 28 59	2 34 50	2 40 46	2 46 49	2 53 0	2 59 15	3 5 33	3 12 3	3 18 33	3 25 14	3 31 56	3 38 49	3 45 40	3 52 45	3 59 57
15	2 24 12	2 29 51	2 35 35	2 41 26	2 47 23	2 53 27	2 59 34	3 5 51	3 12 8	3 18 36	3 25 6	3 31 46	3 38 24	3 45 18	3 52 17
16	2 19 41	2 25 10	2 30 42	2 36 21	2 42 5	2 47 58	2 53 55	2 59 59	3 6 4	3 12 20	3 18 39	3 25 6	3 31 33	3 38 14	3 45 0
17	2 15 23	2 20 42	2 26 3	2 31 31	2 37 4	2 42 47	2 48 35	2 54 27	3 0 21	3 6 25	3 12 33	3 18 48	3 25 5	3 31 33	3 38 6
18	2 11 18	2 16 27	2 21 38	2 26 56	2 32 20	2 37 53	2 43 31	2 49 12	2 54 56	3 0 49	3 6 47	3 12 50	3 18 58	3 25 13	3 31 33
19	2 7 25	2 12 25	2 17 27	2 22 36	2 27 51	2 33 14	2 38 42	2 44 13	2 49 48	2 55 31	3 1 19	3 7 11	3 13 11	3 19 13	3 25 21
20	2 3 44	2 8 35	2 13 29	2 18 29	2 23 36	2 28 49	2 34 7	2 39 29	2 44 56	2 50 30	2 56 8	3 1 49	3 7 42	3 13 32	3 19 28
21	2 0 13	2 4 55	2 9 41	2 14 34	2 19 32	2 24 36	2 29 44	2 34 57	2 40 11	2 45 41	2 51 9	2 56 41	3 2 22	3 8 3	3 13 51
22	1 56 52	2 1 25	2 6 4	2 10 49	2 15 39	2 20 34	2 25 32	2 30 36	2 35 38	2 41 3	2 46 22	2 51 45	2 57 15	3 2 48	3 8 29
23	1 53 41	1 58 6	2 2 37	2 7 14	2 11 55	2 16 41	2 21 31	2 26 26	2 31 16	2 36 36	2 41 46	2 47 1	2 52 20	2 57 45	3 3 20

LATITUDE 14° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 11 7	0 11 31	0 12 11	0 13 5	0 14 15	0 15 45	0 17 24	0 19 22	0 21 33	0 24 1	0 26 43	0 29 43	0 32 54	0 36 20	0 40 1
1	0 11 9	0 11 38	0 12 19	0 13 14	0 14 30	0 16 2	0 17 54	0 19 59	0 22 18	0 24 58	0 27 53	0 30 50	0 34 29	0 38 12	0 42 7
2	0 11 14	0 11 39	0 12 24	0 13 28	0 14 51	0 16 31	0 18 27	0 20 43	0 23 21	0 26 10	0 29 16	0 32 40	0 36 23	0 40 23	0 44 36
3	0 11 16	0 11 43	0 12 33	0 13 41	0 15 16	0 16 58	0 19 9	0 21 36	0 24 26	0 27 30	0 30 51	0 34 34	0 38 37	0 42 53	0 47 27
4	0 11 18	0 11 47	0 12 41	0 13 56	0 15 39	0 17 36	0 19 54	0 22 37	0 25 41	0 29 2	0 32 44	0 36 46	0 41 12	0 45 49	0 50 47
5	0 11 19	0 11 52	0 12 52	0 14 15	0 16 11	0 18 19	0 20 51	0 23 48	0 27 17	0 30 54	0 34 59	0 39 29	0 44 17	0 49 24	0 54 48
6	0 11 21	0 11 58	0 13 10	0 14 39	0 16 47	0 19 14	0 22 7	0 25 23	0 29 11	0 33 17	0 37 48	0 42 42	0 48 2	0 53 41	0 59 42
7	0 11 24	0 12 13	0 13 27	0 15 13	0 17 34	0 20 21	0 23 37	0 27 19	0 31 30	0 36 14	0 41 21	0 46 49	0 52 44	0 59 4	1 5 47
8	0 11 28	0 12 22	0 13 45	0 15 49	0 18 16	0 21 45	0 25 35	0 29 49	0 34 41	0 40 1	0 45 51	0 52 3	0 58 49	1 5 57	1 13 23
9	0 11 32	0 12 37	0 14 21	0 16 43	0 19 57	0 23 46	0 28 19	0 33 19	0 38 59	0 45 16	0 51 52	0 59 4	1 6 55	1 14 50	1 23 23
10	0 11 38	0 12 52	0 14 59	0 18 11	0 22 11	0 26 35	0 32 11	0 38 16	0 45 13	0 52 30	1 0 21	1 8 45	1 17 42	1 26 56	1 36 44
11	0 11 44	0 13 33	0 16 22	0 20 22	0 25 30	0 31 30	0 38 14	0 45 49	0 54 22	1 3 12	1 11 39	1 22 39	1 33 0	1 43 58	1 55 5
12	0 12 13	0 14 42	0 18 47	0 24 37	0 31 42	0 39 47	0 48 47	0 58 42	1 9 16	1 20 15	1 31 45	1 43 37	1 55 59	2 8 31	2 20 57
13	0 12 50	0 17 50	0 25 20	0 34 45	0 45 50	0 57 14	1 9 38	1 22 17	1 35 33	1 48 55	2 2 28	2 16 0	2 30 3	2 43 57	2 58 3
14	Not	calcula	ble.												
15	0 12 50	0 17 45	0 25 14	0 34 38	0 45 29	0 57 1	1 9 14	1 21 45	1 35 14	1 48 14	2 1 51	2 15 27	2 29 27	2 43 7	2 57 14
16	0 12 13	0 14 37	0 18 44	0 24 16	0 31 22	0 39 27	0 48 16	0 57 50	1 8 27	1 19 23	1 30 37	1 42 26	1 54 34	2 7 2	2 19 26
17	0 11 44	0 13 30	0 16 14	0 19 58	0 24 58	0 30 55	0 37 39	0 44 58	0 53 18	1 2 1	1 11 22	1 20 56	1 31 28	1 41 53	1 52 56
18	0 11 38	0 12 49	0 14 55	0 17 49	0 21 42	0 26 16	0 31 30	0 37 24	0 44 4	0 51 7	0 58 47	1 6 59	1 15 40	1 24 46	1 34 11
19	0 11 32	0 12 30	0 14 12	0 16 34	0 19 40	0 23 16	0 27 32	0 32 25	0 37 48	0 43 48	0 50 16	0 57 10	1 4 43	1 12 23	1 20 36
20	0 11 26	0 12 16	0 13 40	0 15 39	0 18 14	0 21 20	0 24 49	0 28 53	0 33 40	0 38 39	0 44 10	0 50 7	0 56 33	1 3 20	1 10 33
21	0 11 22	0 12 8	0 13 19	0 14 53	0 17 9	0 19 46	0 22 50	0 26 24	0 30 24	0 34 49	0 39 37	0 44 47	0 50 29	0 56 26	1 2 41
22	0 11 20	0 11 54	0 12 57	0 14 27	0 16 23	0 18 39	0 21 23	0 24 27	0 27 56	0 31 48	0 36 0	0 40 39	0 45 41	0 50 56	0 56 36
23	0 11 17	0 11 48	0 12 44	0 13 59	0 15 44	0 17 44	0 20 10	0 22 52	0 26 0	0 29 32	0 33 15	0 37 20	0 41 47	0 46 35	0 51 38

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 11 7	0 11 31	0 12 11	0 13 5	0 14 15	0 15 45	0 17 24	0 19 22	0 21 33	0 24 1	0 26 43	0 29 43	0 32 54	0 36 20	0 40 1
1	0 11 6	0 11 28	0 12 5	0 12 57	0 14 3	0 15 26	0 16 58	0 18 46	0 20 51	0 23 9	0 25 42	0 28 32	0 31 32	0 34 46	0 38 10
2	0 11 5	0 11 25	0 12 0	0 12 49	0 13 51	0 15 8	0 16 35	0 18 15	0 20 13	0 22 22	0 24 47	0 27 27	0 30 18	0 33 20	0 36 32
3	0 11 4	0 11 23	0 11 55	0 12 41	0 13 40	0 14 51	0 16 14	0 17 48	0 19 40	0 21 41	0 23 58	0 26 29	0 29 11	0 32 3	0 35 4
4	0 11 3	0 11 21	0 11 50	0 12 33	0 13 30	0 14 36	0 15 55	0 17 25	0 19 11	0 21 5	0 23 14	0 25 36	0 28 10	0 30 51	0 33 45
5	0 11 2	0 11 19	0 11 45	0 12 26	0 13 21	0 14 23	0 15 37	0 17 5	0 18 45	0 20 33	0 22 34	0 24 47	0 27 14	0 29 47	0 32 33
6	0 11 0	0 11 17	0 11 41	0 12 20	0 13 12	0 14 12	0 15 21	0 16 47	0 18 23	0 20 5	0 21 59	0 24 5	0 26 25	0 28 50	0 31 28
7	0 10 58	0 11 14	0 11 37	0 12 14	0 13 4	0 14 1	0 15 7	0 16 30	0 18 2	0 19 39	0 21 27	0 23 27	0 25 41	0 27 58	0 30 28
8	0 10 56	0 11 11	0 11 33	0 12 9	0 12 56	0 13 51	0 14 54	0 16 13	0 17 41	0 19 13	0 20 56	0 22 51	0 24 59	0 27 10	0 29 33
9	0 10 54	0 11 8	0 11 30	0 12 4	0 12 48	0 13 41	0 14 42	0 15 56	0 17 21	0 18 49	0 20 28	0 22 18	0 24 20	0 26 26	0 28 43
10	0 10 52	0 11 5	0 11 27	0 11 59	0 12 41	0 13 32	0 14 31	0 15 40	0 17 1	0 18 26	0 20 2	0 21 47	0 23 43	0 25 45	0 27 58
11	0 10 50	0 11 3	0 11 23	0 11 54	0 12 34	0 13 23	0 14 20	0 15 24	0 16 52	0 18 4	0 19 38	0 21 19	0 23 11	0 25 7	0 27 15
12	0 10 48	0 11 0	0 11 19	0 11 49	0 12 27	0 13 14	0 14 10	0 15 10	0 16 35	0 17 44	0 19 15	0 20 52	0 22 40	0 24 32	0 26 35
13	0 10 46	0 10 58	0 11 16	0 11 45	0 12 21	0 13 6	0 14 0	0 14 58	0 16 20	0 17 26	0 18 54	0 20 27	0 22 11	0 23 59	0 25 57
14	0 10 44	0 10 55	0 11 13	0 11 41	0 12 16	0 12 59	0 13 51	0 14 48	0 16 7	0 17 10	0 18 34	0 20 3	0 21 43	0 23 28	0 25 21
15	0 10 41	0 10 52	0 11 10	0 11 37	0 12 11	0 12 53	0 13 43	0 14 39	0 15 45	0 16 55	0 18 15	0 19 42	0 21 17	0 22 59	0 24 48
16	0 10 40	0 10 51	0 11 8	0 11 34	0 12 7	0 12 47	0 13 35	0 14 31	0 15 34	0 16 42	0 17 59	0 19 23	0 20 54	0 22 33	0 24 18
17	0 10 40	0 10 50	0 11 7	0 11 31	0 12 4	0 12 42	0 13 28	0 14 23	0 15 24	0 16 30	0 17 44	0 19 5	0 20 33	0 22 9	0 23 50
18	0 10 39	0 10 49	0 11 6	0 11 29	0 12 1	0 12 37	0 13 22	0 14 15	0 15 14	0 16 18	0 17 29	0 18 47	0 20 12	0 21 45	0 23 23
19	0 10 38	0 10 48	0 11 5	0 11 27	0 11 58	0 12 33	0 13 16	0 14 7	0 15 4	0 16 6	0 17 15	0 18 30	0 19 52	0 21 22	0 22 57
20	0 10 38	0 10 48	0 11 4	0 11 25	0 11 55	0 12 29	0 13 11	0 13 59	0 14 54	0 15 54	0 17 1	0 18 14	0 19 33	0 21 0	0 22 32
21	0 10 37	0 10 46	0 11 2	0 11 22	0 11 51	0 12 24	0 13 4	0 13 51	0 14 44	0 15 42	0 16 47	0 17 58	0 19 15	0 20 39	0 22 8
22	0 10 35	0 10 44	0 10 59	0 11 19	0 11 47	0 12 19	0 12 58	0 13 43	0 14 34	0 15 31	0 16 34	0 17 43	0 18 58	0 20 19	0 21 45
23	0 10 33	0 10 42	0 10 56	0 11 16	0 11 43	0 12 14	0 12 52	0 13 35	0 14 25	0 15 21	0 16 21	0 17 28	0 18 41	0 19 59	0 21 23

LATITUDE 14° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 43 57	0 48 7	0 52 30	0 57 7	1 1 58	1 7 1	1 12 17	1 17 47	1 23 30	1 29 22	1 35 30	1 41 47	1 48 15	1 54 57	2 1 48
1	0 46 22	0 50 42	0 55 32	1 0 26	1 5 35	1 10 59	1 16 35	1 22 27	1 28 30	1 34 44	1 41 15	1 47 54	1 54 47	2 1 52	2 9 7
2	0 49 5	0 53 53	0 58 57	1 4 12	1 9 43	1 15 28	1 21 30	1 27 41	1 34 8	1 40 49	1 47 43	1 54 51	2 2 8	2 9 39	2 17 20
3	0 52 19	0 57 28	1 2 55	1 8 34	1 14 28	1 20 39	1 27 9	1 33 47	1 40 40	1 47 49	1 55 14	2 2 47	2 10 33	2 18 30	2 26 41
4	0 56 5	1 1 43	1 7 35	1 13 37	1 20 1	1 26 46	1 33 41	1 40 49	1 48 16	1 55 58	2 3 49	2 11 50	2 20 10	2 28 43	2 37 25
5	1 0 35	1 6 43	1 12 59	1 19 42	1 26 40	1 33 56	1 41 24	1 49 8	1 57 8	2 5 26	2 13 48	2 22 30	2 31 23	2 40 31	2 49 45
6	1 6 2	1 12 41	1 19 41	1 26 57	1 34 36	1 42 30	1 50 36	1 59 0	2 7 39	2 16 30	2 25 37	2 34 57	2 44 29	2 54 13	3 4 7
7	1 12 43	1 20 11	1 27 54	1 35 53	1 44 14	1 52 51	2 1 46	2 10 51	2 20 12	2 29 52	2 39 40	2 49 41	2 59 55	3 10 29	3 20 59
8	1 21 15	1 29 35	1 38 3	1 46 54	1 56 9	2 5 40	2 15 17	2 25 13	2 35 26	2 45 32	2 56 29	3 7 19	3 18 16	3 29 27	3 40 46
9	1 32 15	1 41 36	1 51 2	2 0 58	2 11 8	2 21 29	2 32 5	2 43 1	2 54 3	3 5 26	3 16 52	3 28 30	3 40 18	3 52 20	4 4 20
10	1 46 49	1 57 15	2 8 3	2 18 53	2 30 11	2 42 34	2 53 20	3 5 11	3 17 14	3 29 25	3 41 44	3 54 16	4 6 47	4 19 34	4 32 27
11	2 6 37	2 18 25	2 30 18	2 42 36	2 54 52	3 7 30	3 20 21	3 32 57	3 45 56	3 59 8	4 12 17	4 25 31	4 38 50	4 52 20	5 5 53
12	2 33 54	2 47 1	3 0 18	3 13 40	3 26 43	3 40 48	3 54 22	4 7 58	4 21 49	4 35 44	4 49 44	5 3 37	5 17 36	5 31 43	5 45 43
13	3 11 54	3 26 24	3 40 30	3 54 45	4 8 58	4 23 18	4 37 20	4 51 54	5 6 20	5 20 45	5 35 2	5 49 35	6 3 54	6 18 28	6 32 49
14	Not calculable.														
15	3 11 7	3 25 24	3 39 24	3 53 39	4 7 43	4 22 1	4 36 14	4 50 36	5 4 47	5 19 15	5 33 29	5 47 49	6 2 12	6 16 32	6 30 53
16	2 32 13	2 45 9	2 58 20	3 11 28	3 24 44	3 38 17	3 51 49	4 5 24	4 18 58	4 32 44	4 46 34	5 0 20	5 14 6	5 28 3	5 42 4
17	2 4 12	2 15 47	2 27 32	2 39 32	2 51 40	3 4 4	3 16 36	3 29 6	3 41 56	3 54 50	4 7 52	4 20 50	4 34 0	4 47 18	5 0 36
18	1 43 58	1 54 20	2 4 41	2 15 22	2 26 16	2 37 34	2 48 51	3 0 30	3 12 14	3 24 5	3 36 16	3 48 25	4 0 42	4 13 11	4 25 43
19	1 29 10	1 38 4	1 47 25	1 56 55	2 6 41	2 16 48	2 27 1	2 37 37	2 48 10	2 59 18	3 10 29	3 21 43	3 33 5	3 44 45	3 56 36
20	1 17 56	1 25 51	1 34 9	1 42 35	1 51 22	2 0 32	2 9 47	2 19 19	2 29 3	2 39 4	2 49 19	2 59 44	3 10 20	3 20 58	3 31 58
21	1 9 21	1 16 27	1 23 42	1 31 16	1 39 11	1 47 22	1 55 49	2 4 31	2 13 24	2 22 34	2 31 55	2 41 30	2 51 15	3 1 12	3 11 21
22	1 2 33	1 8 53	1 15 20	1 22 13	1 29 20	1 36 44	1 43 54	1 52 19	2 0 29	2 8 53	2 17 30	2 26 16	2 35 16	2 44 30	2 53 56
23	0 56 59	1 2 43	1 8 37	1 14 45	1 21 15	1 27 59	1 35 3	1 42 15	1 49 42	1 57 23	2 5 22	2 13 26	2 21 44	2 30 17	2 38 58

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 43 57	0 48 7	0 52 30	0 57 7	1 1 58	1 7 1	1 12 17	1 17 47	1 23 30	1 29 22	1 35 30	1 41 47	1 48 15	1 54 57	2 1 48
1	0 41 50	0 45 45	0 49 54	0 54 14	0 58 47	1 3 33	1 8 32	1 13 42	1 19 5	1 24 39	1 30 25	1 36 23	1 42 31	1 48 51	1 55 22
2	0 39 58	0 43 39	0 47 36	0 51 40	0 55 56	1 0 27	1 5 11	1 10 2	1 15 6	1 20 23	1 25 49	1 31 29	1 37 19	1 43 19	1 49 30
3	0 38 20	0 41 49	0 45 32	0 49 21	0 53 24	0 57 41	1 2 10	1 6 47	1 11 36	1 16 41	1 21 47	1 27 10	1 32 43	1 38 26	1 44 20
4	0 36 51	0 40 10	0 43 39	0 47 17	0 51 8	0 55 13	0 59 27	1 3 51	1 8 26	1 13 20	1 18 7	1 23 14	1 28 31	1 33 58	1 39 35
5	0 35 30	0 38 39	0 41 57	0 45 27	0 49 7	0 53 0	0 57 0	1 1 12	1 5 33	1 10 17	1 14 46	1 19 38	1 24 40	1 29 52	1 35 13
6	0 34 17	0 37 17	0 40 26	0 43 48	0 47 18	0 51 3	0 54 50	0 58 51	1 2 57	1 7 26	1 11 46	1 16 25	1 21 13	1 26 11	1 31 18
7	0 33 10	0 36 2	0 39 3	0 42 16	0 45 37	0 49 15	0 52 50	0 56 40	1 0 33	1 4 48	1 8 59	1 13 26	1 18 1	1 22 46	1 27 40
8	0 32 8	0 34 52	0 37 46	0 40 50	0 44 2	0 47 34	0 50 57	0 54 37	0 58 19	1 2 21	1 6 24	1 10 40	1 15 3	1 19 37	1 24 19
9	0 31 11	0 33 48	0 36 35	0 39 30	0 42 34	0 46 0	0 49 11	0 52 41	0 56 16	1 0 6	1 4 1	1 8 7	1 12 19	1 16 42	1 21 13
10	0 30 19	0 32 49	0 35 29	0 38 16	0 41 12	0 44 32	0 47 31	0 50 51	0 54 23	0 58 2	1 1 49	1 5 46	1 9 48	1 14 1	1 18 22
11	0 29 31	0 31 56	0 34 29	0 37 8	0 39 57	0 43 8	0 46 3	0 49 16	0 52 40	0 56 8	0 59 46	1 3 34	1 7 27	1 11 30	1 15 42
12	0 28 46	0 31 6	0 33 33	0 36 5	0 38 48	0 41 50	0 44 41	0 47 47	0 51 3	0 54 22	0 57 52	1 1 32	1 5 17	1 9 11	1 13 13
13	0 28 3	0 30 18	0 32 39	0 35 6	0 37 43	0 40 36	0 43 23	0 46 22	0 49 31	0 52 43	0 56 6	0 59 38	1 3 15	1 7 1	1 10 54
14	0 27 22	0 29 32	0 31 48	0 34 11	0 36 42	0 39 26	0 42 9	0 45 2	0 48 4	0 51 11	0 54 27	0 57 51	1 1 21	1 4 59	1 8 43
15	0 26 44	0 28 49	0 31 0	0 33 19	0 35 44	0 38 19	0 40 59	0 43 46	0 46 41	0 49 44	0 52 53	0 56 9	0 59 32	1 3 2	1 6 40
16	0 26 10	0 28 11	0 30 18	0 32 30	0 34 50	0 37 18	0 39 52	0 42 33	0 45 22	0 48 22	0 51 25	0 54 35	0 57 51	1 1 14	1 4 45
17	0 25 38	0 27 35	0 29 38	0 31 44	0 34 0	0 36 23	0 38 52	0 41 28	0 44 12	0 47 6	0 50 3	0 53 7	0 56 17	0 59 33	1 2 57
18	0 25 8	0 27 1	0 29 0	0 31 1	0 33 13	0 35 32	0 37 56	0 40 27	0 43 6	0 45 54	0 48 45	0 51 43	0 54 47	0 57 57	1 1 15
19	0 24 39	0 26 28	0 28 23	0 30 21	0 32 29	0 34 44	0 37 3	0 39 30	0 42 4	0 44 45	0 47 30	0 50 23	0 53 21	0 56 25	0 59 37
20	0 24 11	0 25 56	0 27 48	0 29 44	0 31 48	0 33 59	0 36 13	0 38 36	0 41 5	0 43 39	0 46 19	0 49 7	0 51 59	0 54 57	0 58 3
21	0 23 44	0 25 26	0 27 14	0 29 8	0 31 8	0 33 15	0 35 25	0 37 43	0 40 7	0 42 36	0 45 11	0 47 54	0 50 41	0 53 34	0 56 34
22	0 23 18	0 24 57	0 26 41	0 28 32	0 30 28	0 32 31	0 34 38	0 36 52	0 39 11	0 41 36	0 44 6	0 46 44	0 49 26	0 52 14	0 55 8
23	0 22 53	0 24 30	0 26 10	0 27 57	0 29 49	0 31 48	0 33 53	0 36 2	0 38 17	0 40 38	0 43 4	0 45 37	0 48 14	0 50 57	0 53 46

LATITUDE 14° NORTH OR SOUTH.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	2 8 51	2 16 5	2 23 30	2 31 3	2 38 46	2 46 41	2 54 42	3 2 55	3 11 18	3 19 48	3 28 18	3 36 58	3 46 7	3 55 10	4 4 22
1	2 2 1	2 8 53	2 15 55	2 23 6	2 30 27	2 37 58	2 45 37	2 53 27	3 1 26	3 9 33	3 17 44	3 26 5	3 34 51	3 43 25	3 52 15
2	1 55 52	2 2 24	2 9 4	2 15 55	2 22 56	2 30 5	2 37 24	2 44 53	2 52 29	3 0 14	3 8 7	3 16 10	3 24 24	3 32 39	3 41 6
3	1 50 19	1 56 33	2 2 54	2 9 27	2 16 8	2 22 58	2 29 57	2 37 6	2 42 22	2 51 48	2 59 22	3 7 4	3 14 59	3 22 53	3 31 0
4	1 45 17	1 51 14	1 57 17	2 3 33	2 9 56	2 16 28	2 23 9	2 29 59	2 36 56	2 44 4	2 51 20	2 58 42	3 6 18	3 13 52	3 21 39
5	1 40 43	1 46 24	1 52 14	1 58 10	2 4 17	2 10 33	2 16 58	2 23 28	2 30 10	2 36 59	2 43 58	2 51 2	2 58 16	3 5 36	3 13 6
6	1 36 33	1 41 58	1 47 33	1 53 16	1 59 6	2 5 6	2 11 15	2 17 32	2 23 57	2 30 29	2 37 10	2 43 59	2 50 55	2 58 0	3 5 11
7	1 32 43	1 37 54	1 43 15	1 48 44	1 54 20	2 0 6	2 5 59	2 12 1	2 18 11	2 24 28	2 30 54	2 37 28	2 44 8	2 51 57	2 57 52
8	1 29 10	1 34 9	1 39 17	1 44 33	1 49 56	1 55 29	2 1 8	2 6 56	2 12 52	2 18 56	2 25 7	2 31 26	2 37 51	2 44 25	2 51 5
9	1 25 52	1 30 40	1 35 36	1 40 39	1 45 50	1 51 10	1 56 37	2 2 11	2 7 54	2 13 44	2 19 41	2 25 47	2 31 58	2 38 18	2 44 44
10	1 22 50	1 27 27	1 32 13	1 37 3	1 42 3	1 47 11	1 52 26	1 57 48	2 3 19	2 8 55	2 14 39	2 20 32	2 26 30	2 32 36	2 38 50
11	1 20 2	1 24 28	1 29 3	1 33 43	1 38 32	1 43 29	1 48 32	1 53 43	1 59 2	2 4 26	2 9 58	2 15 39	2 21 24	2 27 17	2 33 18
12	1 17 25	1 21 41	1 26 6	1 30 37	1 35 15	1 40 2	1 44 54	1 49 55	1 55 2	2 0 15	2 5 36	2 11 5	2 16 39	2 22 19	2 28 8
13	1 14 57	1 19 4	1 23 20	1 27 42	1 32 10	1 36 47	1 41 29	1 46 20	1 51 17	1 56 20	2 1 30	2 6 48	2 12 11	2 17 40	2 23 18
14	1 12 38	1 16 37	1 20 44	1 24 57	1 29 17	1 33 45	1 38 16	1 42 57	1 47 45	1 52 38	1 57 37	2 2 45	2 7 58	2 13 17	2 18 44
15	1 10 28	1 14 19	1 18 17	1 22 22	1 26 34	1 30 52	1 35 14	1 39 46	1 44 25	1 49 8	1 53 58	1 58 56	2 4 0	2 9 9	2 14 25
16	1 8 25	1 12 9	1 15 58	1 19 55	1 23 59	1 28 7	1 32 22	1 36 46	1 41 16	1 45 50	1 50 31	1 55 19	2 0 14	2 5 13	2 10 19
17	1 6 28	1 10 5	1 13 46	1 17 35	1 21 31	1 25 31	1 29 39	1 33 55	1 38 17	1 42 42	1 47 14	1 51 54	1 56 40	2 1 29	2 6 25
18	1 4 37	1 8 7	1 11 41	1 15 23	1 19 11	1 23 3	1 27 5	1 31 13	1 35 27	1 39 44	1 44 8	1 48 39	1 53 16	1 57 56	2 2 43
19	1 2 52	1 6 15	1 9 43	1 13 18	1 16 59	1 20 44	1 24 39	1 28 39	1 32 45	1 36 55	1 41 11	1 45 34	1 50 2	1 54 34	1 59 13
20	1 1 13	1 4 29	1 7 52	1 11 20	1 14 54	1 18 33	1 22 20	1 26 12	1 30 10	1 34 13	1 38 21	1 42 37	1 46 57	1 51 22	1 55 53
21	0 59 39	1 2 49	1 6 6	1 9 28	1 12 56	1 16 28	1 20 8	1 23 52	1 27 43	1 31 39	1 35 40	1 39 48	1 44 1	1 48 17	1 52 41
22	0 58 9	1 1 13	1 4 24	1 7 41	1 11 3	1 14 29	1 18 2	1 21 39	1 25 24	1 29 13	1 33 7	1 37 7	1 41 13	1 45 21	1 49 38
23	0 56 41	0 59 40	1 2 45	1 5 57	1 9 12	1 12 33	1 15 59	1 19 31	1 23 10	1 26 53	1 30 40	1 34 33	1 38 32	1 42 32	1 46 44

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	4 13 40	4 23 6	4 32 38	4 42 18	4 52 4	5 1 58	5 11 57	5 22 4	5 32 16	5 42 34	5 52 58	6 3 27	6 14 2	6 24 43	6 35 28
1	4 1 9	4 10 12	4 19 22	4 28 42	4 38 3	4 47 33	4 57 11	5 6 56	5 16 35	5 26 37	5 36 39	5 46 46	5 56 59	6 7 18	6 17 42
2	3 49 40	3 58 20	4 7 10	4 16 11	4 25 8	4 34 17	4 43 34	4 52 57	5 2 13	5 12 0	5 21 42	5 31 29	5 41 22	5 51 21	6 1 25
3	3 39 9	3 47 30	3 56 0	4 4 38	4 13 17	4 22 6	4 31 3	4 40 4	4 49 7	4 58 28	5 7 49	5 17 16	5 26 49	5 36 28	5 46 9
4	3 29 31	3 37 34	3 45 44	3 53 59	4 2 22	4 10 52	4 19 30	4 28 11	4 37 2	4 45 58	4 55 0	5 4 8	5 13 22	5 22 43	5 32 2
5	3 20 40	3 28 24	3 36 15	3 44 12	3 52 17	4 0 29	4 8 45	4 17 9	4 25 40	4 34 21	4 42 59	4 51 50	5 0 49	5 9 54	5 18 51
6	3 12 31	3 19 57	3 27 31	3 35 11	3 42 59	3 50 52	3 58 53	4 7 0	4 15 14	4 23 35	4 31 58	4 40 34	4 49 13	4 57 58	5 6 47
7	3 4 56	3 12 5	3 19 22	3 26 46	3 34 18	3 41 55	3 49 39	3 57 30	4 5 27	4 13 31	4 21 39	4 29 57	4 38 19	4 46 47	4 55 21
8	2 57 53	3 4 47	3 11 49	3 18 58	3 26 14	3 33 35	3 41 3	3 48 39	3 56 20	4 4 8	4 12 2	4 20 2	4 28 7	4 36 19	4 44 38
9	2 51 18	2 57 58	3 4 45	3 11 39	3 18 40	3 25 45	3 32 58	3 40 20	3 47 44	3 55 18	4 2 58	4 10 41	4 18 32	4 26 30	4 34 30
10	2 45 10	2 51 37	2 58 10	3 4 50	3 11 36	3 18 27	3 25 27	3 32 35	3 39 43	3 47 3	3 54 29	4 1 55	4 9 33	4 17 17	4 24 58
11	2 39 26	2 45 40	2 52 0	2 58 26	3 4 59	3 11 37	3 18 22	3 25 16	3 32 11	3 39 17	3 46 28	3 53 43	4 1 4	4 8 35	4 16 2
12	2 34 4	2 40 5	2 46 13	2 52 26	2 58 47	3 5 12	3 11 41	3 18 24	3 25 7	3 32 0	3 38 56	3 46 0	3 53 6	4 0 24	4 7 37
13	2 29 3	2 34 52	2 40 48	2 46 50	2 52 59	2 59 12	3 5 30	3 11 58	3 18 30	3 25 12	3 31 53	3 38 46	3 45 36	3 52 42	3 59 42
14	2 24 17	2 29 55	2 35 39	2 41 30	2 47 28	2 53 30	2 59 38	3 5 54	3 12 15	3 18 42	3 25 13	3 31 51	3 38 32	3 45 23	3 52 15
15	2 19 47	2 25 15	2 30 48	2 36 28	2 42 15	2 48 6	2 54 4	3 0 8	3 6 18	3 12 32	3 18 54	3 25 19	3 31 51	3 38 28	3 45 12
16	2 15 31	2 20 50	2 26 13	2 31 43	2 37 19	2 42 59	2 48 47	2 54 39	3 0 39	3 6 40	3 12 53	3 19 5	3 25 28	3 31 51	3 38 27
17	2 11 27	2 16 37	2 21 51	2 27 11	2 32 37	2 38 8	2 43 48	2 49 27	2 55 17	3 1 8	3 7 9	3 13 12	3 19 23	3 25 35	3 32 0
18	2 7 36	2 12 37	2 17 42	2 22 53	2 28 9	2 33 31	2 39 3	2 44 30	2 50 10	2 55 51	3 1 41	3 7 36	3 13 36	3 19 37	3 25 52
19	2 3 58	2 8 49	2 13 45	2 18 47	2 23 54	2 29 7	2 34 32	2 39 47	2 45 18	2 50 49	2 56 28	3 2 15	3 8 4	3 13 55	3 20 0
20	2 0 30	2 5 12	2 10 0	2 14 53	2 19 51	2 24 55	2 30 13	2 35 16	2 40 38	2 46 0	2 51 28	2 57 7	3 2 45	3 8 26	3 14 21
21	1 57 10	2 1 44	2 6 24	2 11 9	2 15 59	2 20 54	2 26 1	2 31 0	2 36 12	2 41 25	2 46 44	2 52 13	2 57 42	3 3 17	3 9 1
22	1 53 59	1 58 25	2 2 57	2 7 34	2 12 17	2 17 3	2 21 59	2 26 54	2 31 57	2 37 1	2 42 11	2 47 30	2 52 50	2 58 19	3 3 52
23	1 50 58	1 55 17	1 59 41	2 4 10	2 8 45	2 13 22	2 18 6	2 22 57	2 27 51	2 32 47	2 37 48	2 42 58	2 48 10	2 53 33	2 58 55

LATITUDE 15° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 11 6	0 11 29	0 12 4	0 12 55	0 14 0	0 15 21	0 16 57	0 18 46	0 20 48	0 23 7	0 25 37	0 28 25	0 31 23	0 34 36	0 38 2
1	0 11 7	0 11 32	0 12 10	0 13 4	0 14 14	0 15 40	0 17 19	0 19 15	0 21 25	0 23 52	0 26 34	0 29 32	0 32 40	0 36 6	0 39 45
2	0 11 8	0 11 35	0 12 17	0 13 14	0 14 31	0 16 2	0 17 49	0 19 53	0 22 13	0 24 50	0 27 42	0 30 51	0 34 12	0 37 52	0 41 46
3	0 11 10	0 11 40	0 12 24	0 13 26	0 14 50	0 16 30	0 18 27	0 20 42	0 23 14	0 26 4	0 29 12	0 32 35	0 36 16	0 40 13	0 44 27
4	0 11 12	0 11 44	0 12 33	0 13 41	0 15 12	0 17 2	0 19 7	0 21 33	0 24 19	0 27 25	0 30 46	0 34 29	0 38 25	0 42 39	0 47 14
5	0 11 14	0 11 49	0 12 42	0 13 57	0 15 36	0 17 35	0 19 52	0 22 35	0 25 35	0 28 57	0 32 29	0 36 38	0 40 57	0 45 37	0 50 33
6	0 11 16	0 11 55	0 12 55	0 14 18	0 16 6	0 18 18	0 20 51	0 23 51	0 27 9	0 30 50	0 34 51	0 39 18	0 43 20	0 49 7	0 54 33
7	0 11 18	0 12 2	0 13 9	0 14 43	0 16 43	0 19 17	0 21 54	0 25 14	0 28 53	0 33 1	0 37 35	0 42 29	0 47 37	0 53 17	0 59 16
8	0 11 21	0 12 10	0 13 26	0 15 13	0 17 31	0 20 18	0 23 28	0 27 15	0 31 25	0 36 5	0 41 7	0 46 36	0 52 28	0 58 41	1 5 26
9	0 11 24	0 12 20	0 13 54	0 15 22	0 18 23	0 21 34	0 25 18	0 29 32	0 34 29	0 39 43	0 45 29	0 51 37	0 58 23	1 5 25	1 12 47
10	0 11 28	0 12 33	0 14 20	0 16 47	0 19 57	0 22 45	0 28 10	0 33 13	0 38 46	0 44 57	0 51 35	0 58 46	1 6 21	1 14 25	1 22 51
11	0 11 38	0 12 52	0 14 59	0 18 11	0 21 57	0 26 40	0 31 55	0 37 59	0 44 49	0 52 11	1 0 2	1 8 21	1 17 22	1 26 31	1 36 11
12	0 11 44	0 13 33	0 16 18	0 20 18	0 25 30	0 31 14	0 37 58	0 45 36	0 53 55	1 2 52	1 12 14	1 22 12	1 32 37	1 43 22	1 54 31
13	0 12 13	0 14 37	0 18 44	0 24 32	0 31 37	0 39 32	0 48 37	0 58 13	1 9 3	1 19 43	1 31 13	1 42 59	1 55 13	2 7 45	2 20 15
14	0 12 50	0 17 45	0 25 14	0 34 38	0 45 29	0 57 1	1 9 14	1 21 45	1 35 14	1 48 14	2 1 51	2 15 27	2 29 27	2 43 7	2 57 14
15	Not calculable.														
16	0 12 50	0 17 45	0 25 14	0 34 20	0 45 1	0 56 50	1 8 54	1 21 17	1 34 28	1 47 45	2 1 14	2 14 38	2 28 38	2 42 16	2 56 10
17	0 12 13	0 14 37	0 18 42	0 24 13	0 30 58	0 38 58	0 47 58	0 57 32	1 8 7	1 18 43	1 29 59	1 41 15	1 53 47	2 6 9	2 18 29
18	0 11 44	0 13 30	0 16 14	0 19 55	0 24 58	0 30 44	0 37 22	0 44 44	0 52 49	1 1 42	1 10 47	1 20 38	1 30 44	1 41 12	1 52 5
19	0 11 36	0 12 47	0 14 52	0 17 47	0 21 42	0 26 2	0 31 16	0 37 11	0 43 42	0 50 45	0 58 27	1 6 30	1 14 58	1 24 1	1 33 29
20	0 11 30	0 12 40	0 14 12	0 16 32	0 19 32	0 23 12	0 27 23	0 32 12	0 37 40	0 43 34	0 49 52	0 56 45	1 4 12	1 11 45	1 19 52
21	0 11 26	0 12 16	0 13 39	0 15 35	0 18 1	0 21 10	0 24 42	0 28 42	0 33 20	0 38 20	0 43 49	0 49 42	0 56 5	1 2 47	1 9 56
22	0 11 22	0 12 8	0 13 17	0 14 52	0 17 9	0 19 40	0 22 41	0 26 13	0 30 13	0 34 35	0 39 16	0 44 24	0 49 56	0 55 53	1 2 8
23	0 11 20	0 11 53	0 12 57	0 14 26	0 16 21	0 18 37	0 21 14	0 24 18	0 27 44	0 31 36	0 35 44	0 40 20	0 45 17	0 50 33	0 56 2

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 11 6	0 11 29	0 12 4	0 12 55	0 14 0	0 15 21	0 16 57	0 18 46	0 20 48	0 23 7	0 25 37	0 28 25	0 31 23	0 34 36	0 38 2
1	0 11 4	0 11 26	0 11 59	0 12 47	0 13 49	0 15 5	0 16 35	0 18 16	0 20 12	0 22 23	0 24 45	0 27 22	0 30 10	0 33 12	0 36 27
2	0 11 2	0 11 23	0 11 54	0 12 40	0 13 39	0 14 50	0 16 14	0 17 48	0 19 39	0 21 42	0 23 57	0 26 25	0 29 4	0 31 56	0 35 1
3	0 11 1	0 11 20	0 11 49	0 12 33	0 13 29	0 14 36	0 15 55	0 17 23	0 19 9	0 21 5	0 23 13	0 25 33	0 28 4	0 30 47	0 33 42
4	0 11 0	0 11 17	0 11 45	0 12 26	0 13 20	0 14 23	0 15 38	0 17 1	0 18 42	0 20 32	0 22 33	0 24 46	0 27 9	0 29 44	0 32 30
5	0 10 59	0 11 15	0 11 41	0 12 19	0 13 11	0 14 11	0 15 22	0 16 42	0 18 18	0 20 2	0 21 57	0 24 3	0 26 19	0 28 46	0 31 24
6	0 10 57	0 11 13	0 11 38	0 12 14	0 13 3	0 14 0	0 15 8	0 16 25	0 17 56	0 19 35	0 21 24	0 23 24	0 25 34	0 27 54	0 30 24
7	0 10 56	0 11 11	0 11 35	0 12 9	0 12 56	0 13 50	0 14 55	0 16 9	0 17 35	0 19 10	0 20 54	0 22 49	0 24 53	0 27 7	0 29 30
8	0 10 54	0 11 9	0 11 32	0 12 5	0 12 49	0 13 41	0 14 43	0 15 54	0 17 16	0 18 47	0 20 27	0 22 17	0 24 16	0 26 24	0 28 41
9	0 10 53	0 11 7	0 11 29	0 12 1	0 12 43	0 13 33	0 14 32	0 15 40	0 16 59	0 18 26	0 20 2	0 21 47	0 23 42	0 25 45	0 27 56
10	0 10 52	0 11 5	0 11 26	0 11 57	0 12 37	0 13 25	0 14 22	0 15 27	0 16 43	0 18 7	0 19 39	0 21 19	0 23 10	0 25 9	0 27 14
11	0 10 50	0 11 3	0 11 23	0 11 53	0 12 32	0 13 18	0 14 12	0 15 15	0 16 28	0 17 49	0 19 17	0 20 53	0 22 40	0 24 35	0 26 35
12	0 10 49	0 11 1	0 11 20	0 11 49	0 12 27	0 13 11	0 14 3	0 15 4	0 16 14	0 17 32	0 18 57	0 20 29	0 22 12	0 24 3	0 25 59
13	0 10 47	0 10 59	0 11 17	0 11 45	0 12 22	0 13 5	0 13 54	0 14 53	0 16 1	0 17 16	0 18 38	0 20 7	0 21 46	0 23 33	0 25 25
14	0 10 46	0 10 57	0 11 15	0 11 41	0 12 17	0 12 59	0 13 46	0 14 43	0 15 48	0 17 1	0 18 20	0 19 46	0 21 21	0 23 4	0 24 52
15	0 10 45	0 10 56	0 11 13	0 11 37	0 12 12	0 12 53	0 13 38	0 14 33	0 15 36	0 16 47	0 18 3	0 19 26	0 20 58	0 22 36	0 24 21
16	0 10 44	0 10 53	0 11 11	0 11 34	0 12 7	0 12 47	0 13 30	0 14 24	0 15 25	0 16 33	0 17 47	0 19 7	0 20 36	0 22 10	0 23 51
17	0 10 42	0 10 51	0 11 9	0 11 31	0 12 3	0 12 41	0 13 23	0 14 15	0 15 15	0 16 20	0 17 31	0 18 49	0 20 15	0 21 46	0 23 23
18	0 10 40	0 10 49	0 11 7	0 11 28	0 11 59	0 12 35	0 13 17	0 14 7	0 15 5	0 16 8	0 17 16	0 18 32	0 19 55	0 21 23	0 22 57
19	0 10 38	0 10 47	0 11 4	0 11 25	0 11 55	0 12 29	0 13 11	0 13 59	0 14 55	0 15 56	0 17 2	0 18 15	0 19 36	0 21 1	0 22 32
20	0 10 36	0 10 45	0 11 1	0 11 22	0 11 51	0 12 24	0 13 5	0 13 51	0 14 45	0 15 44	0 16 48	0 17 59	0 19 17	0 20 40	0 22 9
21	0 10 34	0 10 43	0 10 58	0 11 19	0 11 47	0 12 19	0 12 59	0 13 43	0 14 35	0 15 32	0 16 34	0 17 44	0 18 59	0 20 20	0 21 47
22	0 10 32	0 10 41	0 10 56	0 11 16	0 11 43	0 12 14	0 12 53	0 13 36	0 14 25	0 15 21	0 16 21	0 17 29	0 18 42	0 20 1	0 21 25
23	0 10 31	0 10 39	0 10 54	0 11 12	0 11 39	0 12 10	0 12 47	0 13 29	0 14 16	0 15 10	0 16 9	0 17 15	0 18 26	0 19 43	0 21 4

LATITUDE 15° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 41 42	0 45 35	0 49 42	0 54 2	0 58 34	1 3 19	1 8 15	1 13 25	1 18 49	1 24 18	1 30 4	1 36 0	1 42 7	1 48 24	1 54 53
1	0 43 38	0 47 45	0 52 7	0 56 42	1 1 31	1 6 32	1 11 45	1 17 17	1 22 52	1 28 43	1 34 47	1 41 3	1 47 28	1 54 5	2 0 55
2	0 45 53	0 50 15	0 54 53	0 59 45	1 4 52	1 10 10	1 15 41	1 21 36	1 27 26	1 33 39	1 40 2	1 46 39	1 53 24	2 0 23	2 7 38
3	0 48 54	0 53 40	0 58 42	1 3 55	1 9 25	1 15 9	1 21 9	1 27 19	1 33 46	1 40 25	1 47 21	1 54 20	2 1 35	2 9 3	2 16 42
4	0 52 6	0 57 12	1 2 37	1 8 14	1 14 11	1 20 19	1 26 45	1 33 21	1 40 14	1 47 19	1 54 39	2 2 10	2 9 50	2 12 52	2 26 2
5	0 56 49	1 1 21	1 7 13	1 13 17	1 19 42	1 26 18	1 33 13	1 40 20	1 47 43	1 55 20	2 3 11	2 11 15	2 19 41	2 27 59	2 36 38
6	1 0 17	1 6 20	1 12 42	1 19 19	1 26 15	1 33 25	1 40 55	1 48 25	1 56 33	2 4 44	2 13 9	2 21 47	2 30 37	2 39 40	2 48 55
7	1 5 39	1 12 17	1 19 13	1 26 24	1 33 59	1 42 38	1 49 54	1 58 15	2 6 54	2 15 46	2 25 2	2 34 1	2 43 30	2 53 11	3 3 4
8	1 12 26	1 19 45	1 27 25	1 35 22	1 43 40	1 52 14	2 1 2	2 10 8	2 19 26	2 28 59	2 38 47	2 48 47	2 58 55	3 9 19	3 19 52
9	1 20 37	1 28 48	1 37 25	1 46 12	1 55 20	2 4 47	2 14 21	2 24 21	2 34 26	2 44 46	2 55 25	3 6 7	3 17 0	3 28 11	3 39 28
10	1 31 43	1 40 52	1 49 22	2 0 10	2 10 18	2 20 39	2 31 13	2 42 4	2 53 7	3 4 17	3 15 45	3 27 19	3 38 4	3 50 57	4 3 0
11	1 46 13	1 56 38	2 7 20	2 18 1	2 29 20	2 40 47	2 52 22	3 4 11	3 16 1	3 28 14	3 40 37	3 52 53	4 5 29	4 18 14	4 30 53
12	2 5 48	2 17 36	2 29 25	2 41 36	2 53 52	3 6 23	3 18 59	3 31 45	3 44 44	3 57 44	4 10 54	4 24 2	4 37 21	4 50 50	5 4 12
13	2 32 59	2 46 4	2 59 26	3 12 31	3 25 55	3 39 33	3 53 2	4 6 49	4 20 28	4 34 0	4 48 5	5 2 3	5 15 51	5 29 57	5 43 55
14	3 11 7	3 25 24	3 39 24	3 53 39	4 7 43	4 22 1	4 36 14	4 50 36	5 4 47	5 19 15	5 33 29	5 47 49	5 2 12	6 16 32	6 30 53
15	Not calculable.														
16	3 10 10	3 24 14	3 38 14	3 52 21	4 6 24	4 20 41	4 34 50	4 48 59	5 3 18	5 17 31	5 31 49	5 45 59	6 0 6	6 14 35	6 28 55
17	2 31 13	2 44 4	2 57 9	3 0 18	3 23 28	3 36 55	3 50 19	4 3 52	4 17 26	4 31 3	4 44 51	4 58 32	5 12 19	5 26 7	5 39 58
18	2 4 19	2 14 42	2 26 32	2 38 21	2 50 30	3 2 52	3 15 2	3 27 45	3 40 25	3 53 12	4 6 11	4 19 0	4 32 12	4 45 20	4 58 38
19	1 43 11	1 53 24	2 3 41	2 14 12	2 25 11	2 36 18	2 47 37	2 59 9	3 10 46	3 22 32	3 34 38	3 46 43	3 58 53	4 11 17	4 23 46
20	1 27 25	1 37 25	1 46 27	1 55 54	2 5 40	2 15 37	2 25 48	2 36 21	2 46 58	2 57 49	3 8 55	3 20 3	3 31 27	3 42 55	3 54 40
21	1 17 18	1 25 9	1 33 14	1 41 42	1 50 25	1 59 23	2 8 39	2 18 3	2 27 49	2 37 42	2 47 50	2 58 12	3 8 43	3 19 20	3 30 10
22	1 8 43	1 15 38	1 22 51	1 30 28	1 38 15	1 46 21	1 54 43	2 3 19	2 12 11	2 21 12	2 30 35	2 39 57	2 49 39	2 59 32	3 9 38
23	1 1 52	1 8 8	1 14 37	1 21 26	1 28 25	1 35 46	1 43 23	1 51 13	1 59 16	2 7 36	2 16 8	2 24 49	2 33 44	2 42 50	2 52 9

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 41 42	0 45 35	0 49 42	0 54 2	0 58 34	1 3 19	1 8 15	1 13 25	1 18 47	1 24 18	1 30 4	1 36 0	1 42 7	1 48 24	1 54 52
1	0 39 56	0 43 37	0 47 31	0 51 36	0 55 53	1 0 22	1 5 1	1 9 54	1 14 58	1 20 7	1 25 36	1 31 14	1 37 3	1 43 2	1 49 11
2	0 38 18	0 41 48	0 45 30	0 49 21	0 53 24	0 57 39	1 2 4	1 6 41	1 11 29	1 16 22	1 21 32	1 26 54	1 32 36	1 38 8	1 43 59
3	0 36 48	0 40 7	0 43 38	0 47 17	0 51 8	0 55 10	0 59 22	1 3 45	1 8 19	1 12 59	1 17 52	1 22 59	1 28 15	1 33 41	1 39 15
4	0 35 26	0 38 35	0 41 55	0 45 23	0 49 3	0 52 54	0 56 54	1 1 4	1 5 25	1 9 55	1 14 33	1 19 26	1 24 27	1 29 39	1 34 58
5	0 34 11	0 37 11	0 40 21	0 43 38	0 47 9	0 50 50	0 54 39	0 58 37	1 2 46	1 7 8	1 11 33	1 16 13	1 21 0	1 25 59	1 31 4
6	0 33 3	0 35 55	0 38 56	0 42 4	0 45 25	0 48 56	0 52 36	0 56 25	1 0 21	1 4 36	1 8 48	1 13 15	1 17 49	1 22 35	1 27 28
7	0 32 2	0 34 47	0 37 39	0 40 39	0 43 50	0 47 13	0 50 44	0 54 24	0 58 9	1 2 14	1 6 15	1 10 30	1 14 52	1 19 26	1 24 7
8	0 31 7	0 33 45	0 36 29	0 39 22	0 42 24	0 45 39	0 49 2	0 52 33	0 56 8	1 0 2	1 3 54	1 7 58	1 12 10	1 16 32	1 21 2
9	0 30 16	0 32 48	0 35 25	0 38 12	0 41 5	0 44 13	0 47 28	0 50 50	0 54 18	0 58 0	1 1 44	1 5 39	1 9 42	1 13 53	1 18 13
10	0 29 29	0 31 55	0 34 26	0 37 8	0 39 52	0 42 54	0 46 0	0 49 14	0 52 36	0 56 8	0 59 45	1 3 32	1 7 27	1 11 28	1 15 39
11	0 28 45	0 31 5	0 33 31	0 36 7	0 38 45	0 41 40	0 44 38	0 47 44	0 50 59	0 54 24	0 57 54	1 1 33	1 5 20	1 9 13	1 13 15
12	0 28 4	0 30 18	0 32 39	0 35 9	0 37 42	0 40 30	0 43 21	0 46 20	0 49 28	0 52 47	0 56 19	0 59 41	1 3 20	1 7 5	1 10 59
13	0 27 26	0 29 34	0 31 50	0 34 14	0 36 43	0 39 24	0 42 9	0 45 2	0 48 3	0 51 15	0 54 31	0 57 55	1 1 26	1 5 4	1 8 50
14	0 26 49	0 28 53	0 31 4	0 33 22	0 35 48	0 38 22	0 41 2	0 43 49	0 46 44	0 49 48	0 52 58	0 56 14	0 59 37	1 3 8	1 6 46
15	0 26 14	0 28 13	0 30 21	0 32 34	0 34 56	0 37 24	0 40 0	0 42 41	0 45 30	0 48 26	0 51 29	0 54 38	0 57 54	1 1 18	1 4 48
16	0 25 41	0 27 34	0 29 40	0 31 49	0 34 6	0 36 29	0 39 1	0 41 36	0 44 20	0 47 9	0 50 6	0 53 9	0 56 19	0 59 35	1 2 59
17	0 25 10	0 26 57	0 29 1	0 31 6	0 33 18	0 35 36	0 38 4	0 40 34	0 43 13	0 45 57	0 48 49	0 51 46	0 54 50	0 57 58	1 1 16
18	0 24 41	0 26 22	0 28 24	0 30 25	0 32 33	0 34 46	0 37 9	0 39 35	0 42 9	0 44 48	0 47 35	0 50 27	0 53 25	0 56 27	0 59 39
19	0 24 13	0 25 50	0 27 49	0 29 46	0 31 50	0 33 59	0 36 17	0 38 39	0 41 8	0 43 42	0 46 24	0 49 11	0 52 3	0 55 1	0 58 7
20	0 23 45	0 25 25	0 27 15	0 29 9	0 31 9	0 33 15	0 35 27	0 37 45	0 40 10	0 42 39	0 45 16	0 47 58	0 50 45	0 53 39	0 56 39
21	0 23 20	0 24 57	0 26 43	0 28 34	0 30 30	0 32 33	0 34 41	0 36 54	0 39 15	0 41 39	0 44 12	0 46 48	0 49 31	0 52 20	0 55 14
22	0 22 55	0 24 30	0 26 13	0 28 0	0 29 53	0 31 52	0 33 57	0 36 6	0 38 22	0 40 42	0 43 10	0 45 42	0 48 20	0 51 4	0 53 53
23	0 22 31	0 24 4	0 25 44	0 27 27	0 29 17	0 31 12	0 33 14	0 35 19	0 37 31	0 39 47	0 42 11	0 44 39	0 47 12	0 49 51	0 52 35

LATITUDE 15° NORTH OR SOUTH.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	2 1 32	2 8 22	2 15 23	2 22 32	2 29 51	2 37 21	2 44 59	2 52 47	3 0 43	3 8 49	3 17 2	3 25 25	3 33 53	3 42 32	3 51 19
1	1 54 25	2 0 55	2 7 34	2 14 23	2 21 20	2 28 28	2 35 44	2 43 10	2 50 43	2 58 26	3 6 16	3 14 16	3 22 17	3 30 40	3 39 30
2	1 49 7	1 55 16	2 1 32	2 8 0	2 14 35	2 21 22	2 28 16	2 35 20	2 42 31	2 49 12	2 57 20	3 4 57	3 12 30	3 20 35	3 28 34
3	1 44 33	1 50 25	1 56 27	2 2 39	2 8 59	2 15 30	2 22 10	2 28 59	2 35 54	2 43 1	2 50 13	2 57 34	3 4 56	3 12 41	3 20 24
4	1 40 28	1 46 7	1 51 55	1 57 51	2 3 57	2 10 12	2 16 34	2 23 7	2 29 46	2 36 35	2 43 31	2 50 36	2 57 47	3 5 7	3 12 35
5	1 36 19	1 41 42	1 47 17	1 52 57	1 58 49	2 4 46	2 10 54	2 17 10	2 23 34	2 30 5	2 36 44	2 43 35	2 50 29	2 57 31	3 4 43
6	1 32 31	1 37 41	1 43 1	1 48 29	1 54 5	1 59 50	2 5 42	2 11 44	2 17 53	2 24 10	2 30 33	2 37 6	2 43 46	2 50 34	2 57 28
7	1 29 2	1 34 0	1 39 6	1 44 21	1 49 43	1 55 15	2 0 54	2 6 41	2 12 37	2 18 40	2 24 49	2 31 7	2 37 32	2 44 6	2 50 45
8	1 25 47	1 30 34	1 35 28	1 40 31	1 45 41	1 51 0	1 56 27	2 2 1	2 7 43	2 13 33	2 19 29	2 25 33	2 31 44	2 38 4	2 44 29
9	1 22 45	1 27 21	1 32 5	1 36 56	1 41 56	1 47 3	1 52 18	1 57 40	2 3 9	2 8 47	2 14 30	2 20 21	2 26 20	2 32 26	2 38 38
10	1 19 57	1 24 23	1 28 58	1 33 37	1 38 27	1 43 22	1 48 26	1 53 38	1 58 54	2 4 20	2 9 52	2 15 30	2 21 17	2 27 10	2 33 10
11	1 17 21	1 21 37	1 26 3	1 30 31	1 35 11	1 39 56	1 44 49	1 49 50	1 54 56	2 0 11	2 5 32	2 10 57	2 16 32	2 22 14	2 28 3
12	1 14 55	1 19 2	1 23 19	1 27 37	1 32 7	1 36 43	1 41 25	1 46 16	1 51 13	1 56 17	2 1 28	2 6 41	2 12 5	2 17 36	2 23 14
13	1 12 37	1 16 35	1 20 43	1 24 53	1 29 14	1 33 41	1 38 13	1 42 54	1 47 42	1 52 36	1 57 37	2 2 40	2 7 54	2 13 14	2 19 41
14	1 10 27	1 14 17	1 18 16	1 22 19	1 26 31	1 30 49	1 35 12	1 39 44	1 44 23	1 49 7	1 53 58	1 58 53	2 3 57	2 9 6	2 15 23
15	1 8 25	1 12 7	1 15 57	1 19 54	1 23 58	1 28 7	1 32 22	1 36 45	1 41 15	1 45 49	1 50 30	1 55 19	2 0 13	2 5 12	2 10 19
16	1 6 30	1 10 5	1 13 48	1 17 37	1 21 32	1 25 34	1 29 42	1 33 57	1 38 18	1 42 43	1 47 16	1 51 56	1 56 41	2 1 31	2 6 28
17	1 4 41	1 8 10	1 11 45	1 15 27	1 19 14	1 23 9	1 27 10	1 31 18	1 35 30	1 39 47	1 44 12	1 48 43	1 53 20	1 58 2	2 2 50
18	1 2 57	1 6 20	1 9 48	1 13 24	1 17 4	1 20 52	1 24 46	1 28 47	1 32 51	1 37 1	1 41 18	1 45 40	1 50 9	1 54 43	1 59 23
19	1 1 18	1 4 35	1 7 57	1 11 27	1 15 0	1 18 41	1 22 28	1 26 22	1 30 19	1 34 22	1 38 31	1 42 45	1 47 6	1 51 33	1 56 5
20	0 59 44	1 2 55	1 6 11	1 9 35	1 13 2	1 16 36	1 20 16	1 24 3	1 27 53	1 31 49	1 35 51	1 39 58	1 44 11	1 48 31	1 52 55
21	0 58 14	1 1 19	1 4 30	1 7 48	1 11 9	1 14 37	1 18 10	1 21 50	1 25 34	1 29 23	1 33 18	1 37 18	1 41 24	1 45 36	1 49 53
22	0 56 48	0 59 47	1 2 53	1 6 5	1 9 21	1 12 43	1 16 10	1 19 43	1 23 21	1 27 4	1 30 52	1 34 45	1 38 44	1 42 49	1 46 59
23	0 55 25	0 58 19	1 1 20	1 4 26	1 7 37	1 10 53	1 14 16	1 17 41	1 21 13	1 24 50	1 28 32	1 32 20	1 36 12	1 40 10	1 44 12

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	4 0 11	4 9 13	4 18 22	4 27 37	4 36 57	4 46 27	4 56 3	5 5 45	5 15 31	5 25 27	5 35 27	5 45 37	5 55 44	6 6 3	6 16 25
1	3 47 33	3 56 12	4 4 58	4 13 50	4 22 48	4 31 54	4 41 6	4 50 26	4 59 49	5 9 20	5 18 58	5 28 42	5 38 30	5 48 26	5 58 25
2	3 36 42	3 44 58	3 53 21	4 1 50	4 10 28	4 19 11	4 28 0	4 36 58	4 46 1	4 55 10	5 4 26	5 13 47	5 23 15	5 32 48	5 42 27
3	3 28 15	3 35 55	3 43 57	3 52 30	4 0 51	4 9 18	4 17 51	4 26 31	4 35 17	4 44 10	4 53 8	5 2 13	5 11 23	5 20 40	5 30 2
4	3 20 10	3 26 53	3 34 55	3 43 38	3 51 42	3 59 52	4 8 10	4 16 33	4 25 3	4 33 40	4 42 22	4 51 11	5 0 5	5 9 6	5 18 12
5	3 12 2	3 19 26	3 26 59	3 34 35	3 42 23	3 50 17	3 58 18	4 6 20	4 14 33	4 22 54	4 31 13	4 39 47	4 48 27	4 57 13	5 5 54
6	3 4 30	3 11 39	3 18 56	3 26 19	3 33 48	3 41 26	3 49 9	3 56 59	4 4 55	4 13 57	4 21 6	4 29 21	4 37 42	4 46 9	4 54 42
7	2 57 32	3 4 26	3 11 28	3 18 35	3 25 49	3 33 11	3 40 38	3 48 13	3 55 54	4 4 41	4 11 34	4 19 33	4 27 38	4 35 50	4 44 7
8	2 51 1	2 57 41	3 4 28	3 11 21	3 18 21	3 25 28	3 32 40	3 40 0	3 47 26	3 54 58	4 2 35	4 10 19	4 18 9	4 26 6	4 34 7
9	2 44 57	2 51 23	2 57 56	3 4 36	3 11 22	3 18 14	3 25 12	3 32 19	3 39 28	3 46 47	3 54 10	4 1 37	4 9 12	4 16 56	4 24 49
10	2 39 17	2 45 30	2 51 50	2 58 17	3 4 49	3 11 27	3 18 11	3 25 5	3 31 57	3 39 4	3 46 16	3 53 27	4 0 51	4 8 22	4 15 48
11	2 33 58	2 39 59	2 46 7	2 52 21	2 58 40	3 5 5	3 11 36	3 18 15	3 24 56	3 31 50	3 38 48	3 45 45	3 52 55	4 0 12	4 7 28
12	2 28 57	2 34 47	2 40 43	2 46 45	2 52 52	2 59 5	3 5 24	3 11 49	3 18 19	3 25 0	3 31 45	3 38 28	3 45 26	3 52 29	3 59 35
13	2 24 13	2 29 52	2 35 37	2 41 28	2 47 24	2 53 26	2 59 34	3 5 45	3 12 5	3 18 34	3 25 6	3 31 37	3 38 25	3 45 15	3 52 11
14	2 19 44	2 25 13	2 30 47	2 36 27	2 42 13	2 48 4	2 54 2	3 0 2	3 6 12	3 12 29	3 18 49	3 25 8	3 31 46	3 38 23	3 45 10
15	2 15 29	2 20 48	2 26 12	2 31 42	2 37 18	2 42 58	2 48 47	2 54 38	3 0 38	3 6 43	3 12 53	3 18 57	3 25 28	3 31 52	3 38 30
16	2 11 28	2 16 38	2 21 52	2 27 12	2 32 38	2 38 8	2 43 46	2 49 29	2 55 19	3 1 13	3 7 14	3 13 10	3 19 28	3 25 41	3 32 9
17	2 7 41	2 12 41	2 17 46	2 22 56	2 28 13	2 33 34	2 39 1	2 44 36	2 50 16	2 56 0	3 1 52	3 7 40	3 13 46	3 19 48	3 26 6
18	2 4 6	2 8 57	2 13 53	2 18 53	2 24 1	2 29 13	2 34 29	2 39 57	2 45 27	2 51 1	2 56 44	3 2 24	3 8 18	3 14 10	3 20 18
19	2 0 41	2 5 24	2 10 12	2 15 3	2 20 2	2 25 5	2 30 10	2 35 31	2 40 51	2 46 15	2 51 49	2 57 21	3 3 3	3 8 45	3 14 43
20	1 57 24	2 2 0	2 6 40	2 11 23	2 16 14	2 21 9	2 26 3	2 31 17	2 36 27	2 41 41	2 47 6	2 52 31	2 58 1	3 3 33	3 9 22
21	1 54 15	1 58 43	2 3 16	2 7 52	2 12 35	2 17 23	2 22 11	2 27 14	2 32 16	2 37 21	2 42 36	2 47 53	2 53 14	2 58 39	3 4 16
22	1 51 14	1 55 34	2 0 0	2 4 29	2 9 4	2 13 44	2 18 27	2 23 19	2 28 14	2 33 11	2 38 17	2 43 26	2 48 39	2 53 57	2 59 22
23	1 48 20	1 52 33	1 56 50	2 1 12	2 5 40	2 10 13	2 14 50	2 19 32	2 24 19	2 29 11	2 34 7	2 39 9	2 44 14	2 49 25	2 54 39

LATITUDE 16° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 11 4	0 11 29	0 11 58	0 12 46	0 13 47	0 15 3	0 16 33	0 18 14	0 20 9	0 22 19	0 24 39	0 27 15	0 30 3	0 33 4	0 36 19
1	0 11 5	0 11 30	0 12 3	0 12 54	0 14 0	0 15 20	0 16 54	0 18 42	0 20 44	0 23 3	0 25 31	0 28 16	0 31 13	0 34 24	0 37 51
2	0 11 7	0 11 32	0 12 8	0 13 2	0 14 13	0 15 38	0 17 18	0 19 13	0 21 24	0 23 53	0 26 31	0 29 27	0 32 35	0 35 59	0 39 40
3	0 11 9	0 11 34	0 12 13	0 13 11	0 14 27	0 15 57	0 17 47	0 19 51	0 22 12	0 24 51	0 27 42	0 30 52	0 34 13	0 37 52	0 41 48
4	0 11 11	0 11 37	0 12 19	0 13 24	0 14 44	0 16 23	0 18 21	0 20 33	0 23 4	0 25 57	0 28 57	0 32 27	0 36 4	0 39 58	0 44 6
5	0 11 14	0 11 41	0 12 31	0 13 37	0 15 9	0 16 54	0 19 3	0 21 27	0 24 14	0 27 19	0 30 36	0 34 17	0 38 18	0 42 29	0 47 0
6	0 11 16	0 11 47	0 12 41	0 14 15	0 15 36	0 17 29	0 19 43	0 22 23	0 25 24	0 28 45	0 32 29	0 36 28	0 40 49	0 45 23	0 50 20
7	0 11 18	0 11 51	0 13 3	0 14 24	0 16 6	0 18 15	0 20 43	0 23 40	0 27 6	0 30 41	0 34 42	0 39 7	0 43 50	0 48 53	0 54 17
8	0 11 21	0 11 57	0 13 7	0 14 38	0 16 40	0 19 8	0 21 53	0 25 13	0 28 56	0 32 57	0 37 30	0 42 20	0 47 34	0 53 11	0 59 4
9	0 11 24	0 12 11	0 13 24	0 15 11	0 17 27	0 20 14	0 23 26	0 27 2	0 31 19	0 35 52	0 40 55	0 46 19	0 52 13	0 58 29	1 5 1
10	0 11 28	0 12 20	0 13 44	0 15 47	0 18 32	0 21 39	0 25 22	0 29 35	0 34 24	0 39 41	0 45 24	0 51 12	0 58 14	1 5 9	1 12 35
11	0 11 32	0 12 34	0 14 16	0 16 41	0 19 50	0 23 37	0 27 57	0 32 55	0 38 37	0 44 43	0 51 19	0 58 28	1 6 2	1 13 58	1 22 23
12	0 11 38	0 12 49	0 14 57	0 17 59	0 21 55	0 26 33	0 31 49	0 37 47	0 44 43	0 51 47	0 59 42	1 7 57	1 16 42	1 25 58	1 35 35
13	0 11 44	0 13 30	0 16 18	0 20 14	0 25 14	0 31 1	0 37 49	0 45 22	0 53 44	1 2 25	1 11 44	1 21 39	1 32 0	1 42 43	1 53 44
14	0 12 13	0 14 37	0 18 44	0 24 16	0 31 22	0 39 27	0 48 16	0 57 50	1 8 27	1 19 23	1 30 37	1 42 26	1 54 34	2 7 2	2 19 26
15	0 12 50	0 17 45	0 25 14	0 34 20	0 45 1	0 56 50	1 8 54	1 21 17	1 34 28	1 47 45	2 1 14	2 14 38	2 28 38	2 42 16	2 56 10
16	Not calcula	ble.													
17	0 12 50	0 17 45	0 24 50	0 34 14	0 45 1	0 56 20	1 8 29	1 20 45	1 33 48	1 47 4	2 0 23	2 13 46	2 27 41	2 41 15	2 55 10
18	0 12 11	0 14 32	0 18 37	0 24 13	0 30 58	0 38 47	0 47 42	0 57 7	1 7 32	1 18 13	1 29 31	1 40 56	1 52 56	2 5 13	2 17 32
19	0 11 42	0 13 25	0 16 12	0 19 52	0 24 46	0 30 39	0 37 5	0 44 25	0 52 36	1 1 5	1 10 12	1 19 46	1 30 0	1 40 25	1 51 14
20	0 11 36	0 12 49	0 14 52	0 17 45	0 21 43	0 25 55	0 31 2	0 36 49	0 43 21	0 50 27	0 57 52	1 5 57	1 14 26	1 23 24	1 32 42
21	0 11 30	0 12 30	0 14 10	0 16 28	0 19 25	0 22 59	0 27 12	0 31 55	0 37 23	0 43 4	0 49 28	0 56 16	1 3 40	1 11 15	1 19 13
22	0 11 26	0 12 14	0 13 39	0 15 33	0 18 1	0 21 1	0 24 35	0 28 33	0 33 1	0 38 3	0 43 30	0 49 18	0 55 37	1 2 12	1 9 14
23	0 11 21	0 11 59	0 13 16	0 14 50	0 16 58	0 19 38	0 22 35	0 25 59	0 29 59	0 34 16	0 38 53	0 44 1	0 49 32	0 55 24	1 1 37

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 11 4	0 11 29	0 11 58	0 12 46	0 13 47	0 15 3	0 16 33	0 18 14	0 20 9	0 22 10	0 24 39	0 27 15	0 30 3	0 33 4	0 36 19
1	0 11 2	0 11 25	0 11 53	0 12 39	0 13 37	0 14 49	0 16 12	0 17 47	0 19 37	0 21 33	0 23 53	0 26 19	0 28 59	0 31 50	0 34 54
2	0 11 0	0 11 22	0 11 49	0 12 33	0 13 27	0 14 36	0 15 53	0 17 23	0 19 8	0 20 59	0 23 11	0 25 29	0 28 1	0 30 42	0 33 36
3	0 10 59	0 11 19	0 11 45	0 12 27	0 13 18	0 14 24	0 15 36	0 17 1	0 18 42	0 20 28	0 22 32	0 24 43	0 27 8	0 29 40	0 32 25
4	0 10 58	0 11 16	0 11 41	0 12 21	0 13 10	0 14 13	0 15 21	0 16 42	0 18 18	0 20 0	0 21 56	0 24 1	0 26 19	0 28 44	0 31 21
5	0 10 57	0 11 13	0 11 37	0 12 15	0 13 3	0 14 3	0 15 8	0 16 25	0 17 56	0 19 34	0 21 23	0 23 23	0 25 34	0 27 53	0 30 23
6	0 10 55	0 11 11	0 11 34	0 12 10	0 12 56	0 13 53	0 14 56	0 16 9	0 17 36	0 19 10	0 20 53	0 22 48	0 24 53	0 27 6	0 29 30
7	0 10 54	0 11 9	0 11 31	0 12 6	0 12 50	0 13 44	0 14 45	0 15 55	0 17 18	0 18 48	0 20 26	0 22 16	0 24 16	0 26 23	0 28 41
8	0 10 53	0 11 7	0 11 28	0 12 2	0 12 44	0 13 35	0 14 34	0 15 41	0 17 1	0 18 27	0 20 1	0 21 46	0 23 42	0 25 43	0 27 56
9	0 10 52	0 11 5	0 11 25	0 11 58	0 12 38	0 13 26	0 14 23	0 15 28	0 16 44	0 18 8	0 19 38	0 21 19	0 23 10	0 25 6	0 27 14
10	0 10 51	0 11 3	0 11 23	0 11 54	0 12 32	0 13 18	0 14 13	0 15 16	0 16 28	0 17 50	0 19 17	0 20 54	0 22 40	0 24 32	0 26 35
11	0 10 49	0 11 1	0 11 20	0 11 50	0 12 27	0 13 10	0 14 3	0 15 4	0 16 13	0 17 32	0 18 57	0 20 31	0 22 12	0 24 0	0 25 57
12	0 10 47	0 10 59	0 11 17	0 11 46	0 12 22	0 13 3	0 13 54	0 14 53	0 15 59	0 17 15	0 18 37	0 20 8	0 21 45	0 23 30	0 25 22
13	0 10 45	0 10 57	0 11 14	0 11 42	0 12 17	0 12 57	0 13 46	0 14 43	0 15 46	0 16 59	0 18 18	0 19 46	0 21 20	0 23 2	0 24 49
14	0 10 43	0 10 55	0 11 11	0 11 38	0 12 12	0 12 51	0 13 38	0 14 34	0 15 34	0 16 44	0 18 0	0 19 25	0 20 57	0 22 36	0 24 18
15	0 10 41	0 10 53	0 11 8	0 11 34	0 12 7	0 12 45	0 13 30	0 14 25	0 15 23	0 16 30	0 17 44	0 19 6	0 20 35	0 22 11	0 23 49
16	0 10 39	0 10 51	0 11 6	0 11 30	0 12 2	0 12 39	0 13 23	0 14 16	0 15 13	0 16 17	0 17 29	0 18 48	0 20 14	0 21 47	0 23 22
17	0 10 37	0 10 49	0 11 4	0 11 27	0 11 58	0 12 34	0 13 17	0 14 8	0 15 3	0 16 5	0 17 15	0 18 31	0 19 54	0 21 24	0 22 57
18	0 10 36	0 10 47	0 11 2	0 11 24	0 11 54	0 12 29	0 13 11	0 14 0	0 14 53	0 15 54	0 17 2	0 18 15	0 19 35	0 21 2	0 22 33
19	0 10 35	0 10 45	0 11 0	0 11 21	0 11 50	0 12 24	0 13 5	0 13 52	0 14 44	0 15 43	0 16 49	0 18 0	0 19 17	0 20 41	0 22 10
20	0 10 34	0 10 43	0 10 58	0 11 18	0 11 46	0 12 19	0 12 59	0 13 44	0 14 35	0 15 33	0 16 36	0 17 45	0 19 0	0 20 21	0 21 48
21	0 10 33	0 10 41	0 10 56	0 11 15	0 11 42	0 12 14	0 12 53	0 13 36	0 14 26	0 15 22	0 16 23	0 17 30	0 18 43	0 20 2	0 21 27
22	0 10 31	0 10 39	0 10 54	0 11 12	0 11 38	0 12 9	0 12 47	0 13 28	0 14 18	0 15 11	0 16 11	0 17 16	0 18 27	0 19 44	0 21 6
23	0 10 29	0 10 37	0 10 51	0 11 10	0 11 35	0 12 5	0 12 41	0 13 21	0 14 10	0 15 1	0 15 59	0 17 2	0 18 11	0 19 26	0 20 46

LATITUDE 16° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 39 44	0 43 23	0 47 15	0 51 18	0 56 34	1 0 2	1 4 42	1 9 32	1 14 35	1 19 49	1 25 15	1 30 50	1 36 35	1 42 34	1 48 41
1	0 41 28	0 45 21	0 49 27	0 53 44	0 59 15	1 2 58	1 7 54	1 13 0	1 18 19	1 23 50	1 29 33	1 35 27	1 41 30	1 47 47	1 54 13
2	0 43 30	0 47 37	0 51 59	0 56 32	1 2 21	1 6 21	1 11 35	1 17 0	1 22 38	1 28 29	1 34 31	1 40 46	1 47 9	1 53 47	2 0 34
3	0 45 54	0 50 22	0 55 2	0 59 54	1 5 2	1 10 21	1 15 56	1 21 42	1 27 41	1 33 54	1 40 18	1 46 56	1 53 42	2 0 43	2 7 54
4	0 48 35	0 53 22	0 58 21	1 3 26	1 8 59	1 14 42	1 20 40	1 26 49	1 33 13	1 39 50	1 46 36	1 53 41	2 0 56	2 8 24	2 15 59
5	0 51 50	0 56 57	1 2 18	1 7 56	1 13 45	1 19 51	1 26 17	1 32 51	1 39 40	1 46 48	1 54 3	2 1 31	2 9 12	2 17 8	2 25 13
6	0 55 34	1 1 5	1 6 55	1 12 54	1 19 16	1 25 54	1 32 43	1 39 48	1 47 9	1 54 46	2 2 31	2 10 32	2 18 41	2 27 8	2 35 46
7	0 59 58	1 5 59	1 12 24	1 18 50	1 25 45	1 32 57	1 40 20	1 47 59	1 55 55	2 4 4	2 12 26	2 20 56	2 29 44	2 38 47	2 47 58
8	1 5 21	1 11 55	1 18 48	1 26 0	1 33 34	1 41 21	1 49 28	1 57 43	2 6 13	2 15 0	2 23 58	2 33 13	2 42 40	2 52 16	3 2 7
9	1 11 54	1 19 18	1 26 51	1 34 49	1 42 59	1 51 40	2 0 21	2 9 22	2 18 36	2 28 4	2 37 49	2 47 45	2 57 52	3 8 15	3 18 39
10	1 20 20	1 28 28	1 36 57	1 45 40	1 54 45	2 4 8	2 13 28	2 23 35	2 33 38	2 43 59	2 54 26	3 5 8	3 15 56	3 26 59	3 38 18
11	1 31 10	1 40 23	1 49 45	1 59 33	2 9 31	2 19 51	2 30 21	2 41 3	2 52 3	3 3 13	3 14 36	3 26 0	3 37 43	3 49 39	4 1 33
12	1 45 33	1 55 49	2 6 33	2 17 9	2 28 24	2 39 43	2 51 20	3 3 1	3 14 50	3 26 59	3 39 11	3 51 34	4 3 58	4 16 53	4 29 19
13	2 5 0	2 16 43	2 28 32	2 40 39	2 52 47	3 5 23	3 17 47	3 30 36	3 43 21	3 56 29	4 9 25	4 22 33	4 35 43	4 49 8	5 2 28
14	2 32 13	2 45 9	2 58 20	3 11 28	3 24 44	3 38 17	3 51 49	4 5 24	4 18 55	4 32 44	4 46 34	5 0 20	5 14 6	5 28 3	5 42 4
15	3 10 10	3 24 14	3 38 14	3 52 21	4 6 24	4 20 41	4 34 50	4 48 59	5 3 18	5 17 31	5 31 49	5 45 59	6 0 6	6 14 35	6 28 55
16	Not calculable.														
17	3 9 3	3 22 55	3 36 58	3 50 55	4 5 2	4 19 1	4 33 16	4 47 25	5 1 32	5 15 42	5 29 54	5 44 4	5 58 19	6 12 33	6 26 41
18	2 30 0	2 43 4	2 55 54	3 8 57	3 22 3	3 35 26	3 48 49	4 2 17	4 15 43	4 29 16	4 43 0	4 56 39	5 10 22	5 24 1	5 37 51
19	2 2 19	2 13 41	2 25 18	2 37 6	2 49 12	3 1 23	3 13 43	3 26 13	3 38 44	3 51 25	4 4 25	4 17 15	4 30 12	4 43 18	4 56 33
20	1 42 20	1 52 20	2 2 41	2 13 12	2 23 53	2 34 53	2 46 14	2 57 41	3 9 11	3 20 52	3 32 52	3 44 55	3 57 2	4 9 17	4 21 43
21	1 27 38	1 36 29	1 41 36	1 54 55	2 4 31	2 14 21	2 24 37	2 34 57	2 45 33	2 56 16	3 7 13	3 18 23	3 29 40	3 41 1	3 52 40
22	1 16 36	1 24 25	1 32 27	1 40 42	1 49 18	1 58 14	2 7 27	2 16 47	2 26 26	2 36 16	2 46 19	2 56 33	3 6 55	3 17 30	3 28 18
23	1 8 5	1 14 51	1 22 12	1 29 35	1 37 19	1 45 19	1 53 39	2 2 11	2 10 55	2 19 49	2 29 9	2 38 30	2 48 2	2 57 49	3 7 47

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 39 44	0 43 23	0 47 15	0 51 18	0 55 34	1 0 2	1 4 42	1 9 32	1 14 35	1 19 49	1 25 15	1 30 50	1 36 35	1 42 34	1 48 41
1	0 38 8	0 41 36	0 45 16	0 49 6	0 53 7	0 57 20	1 1 46	1 6 22	1 11 9	1 16 8	1 21 17	1 26 36	1 32 4	1 37 46	1 43 37
2	0 36 40	0 39 58	0 43 26	0 47 5	0 50 54	0 54 54	0 59 7	1 3 30	1 8 3	1 12 48	1 17 41	1 22 45	1 27 57	1 33 23	1 38 59
3	0 35 20	0 38 29	0 41 46	0 45 15	0 48 53	0 52 41	0 56 42	1 0 53	1 5 13	1 9 45	1 14 24	1 19 14	1 24 12	1 29 24	1 34 45
4	0 34 8	0 37 8	0 40 15	0 43 35	0 47 3	0 50 40	0 54 30	0 58 30	1 2 38	1 6 58	1 11 24	1 16 1	1 20 46	1 25 45	1 30 51
5	0 33 3	0 35 55	0 38 53	0 42 4	0 45 23	0 48 50	0 52 30	0 56 19	1 0 16	1 4 25	1 8 39	1 13 4	1 17 37	1 22 23	1 27 15
6	0 32 3	0 34 48	0 37 37	0 40 40	0 43 51	0 47 10	0 50 41	0 54 21	0 58 9	1 2 7	1 6 9	1 10 22	1 14 43	1 19 16	1 23 55
7	0 31 8	0 33 46	0 36 28	0 39 23	0 42 27	0 45 38	0 49 0	0 52 31	0 56 10	0 59 58	1 3 50	1 7 52	1 12 3	1 16 24	1 20 51
8	0 30 17	0 32 49	0 35 24	0 38 12	0 41 9	0 44 13	0 47 26	0 50 49	0 54 19	0 57 58	1 1 41	1 5 34	1 9 36	1 13 46	1 18 3
9	0 29 29	0 31 55	0 34 25	0 37 6	0 39 56	0 42 53	0 45 58	0 49 13	0 52 35	0 56 6	0 59 41	1 3 26	1 7 20	1 11 21	1 15 29
10	0 28 44	0 31 4	0 33 30	0 36 4	0 38 47	0 41 37	0 44 36	0 47 43	0 50 57	0 54 21	0 57 49	1 1 27	1 5 13	1 9 7	1 13 8
11	0 28 2	0 30 17	0 32 38	0 35 6	0 37 43	0 40 26	0 43 19	0 46 19	0 49 27	0 52 43	0 56 5	0 59 36	1 3 15	1 7 1	1 10 55
12	0 27 23	0 29 33	0 31 50	0 34 13	0 36 44	0 39 21	0 42 8	0 45 1	0 48 3	0 51 11	0 54 27	0 57 52	1 1 24	1 5 3	1 8 50
13	0 26 46	0 28 52	0 31 5	0 33 23	0 35 48	0 38 20	0 41 1	0 43 48	0 46 44	0 49 45	0 52 55	0 56 14	0 59 39	1 3 11	1 6 51
14	0 26 11	0 28 13	0 30 22	0 32 36	0 34 56	0 37 23	0 39 59	0 42 40	0 45 30	0 48 25	0 51 29	0 54 41	0 58 0	1 1 25	1 4 58
15	0 25 38	0 27 36	0 29 41	0 31 51	0 34 7	0 36 29	0 39 0	0 41 36	0 44 20	0 47 10	0 50 8	0 53 13	0 56 26	0 59 44	1 3 10
16	0 25 7	0 27 1	0 29 2	0 31 8	0 33 20	0 35 38	0 38 4	0 40 35	0 43 14	0 45 59	0 48 51	0 51 50	0 54 57	0 58 8	1 1 27
17	0 24 38	0 26 28	0 28 25	0 30 27	0 32 35	0 34 49	0 37 11	0 39 37	0 42 11	0 44 51	0 47 38	0 50 31	0 53 32	0 56 36	0 59 49
18	0 24 11	0 25 57	0 27 50	0 29 48	0 31 52	0 34 2	0 36 20	0 38 42	0 41 11	0 43 46	0 46 28	0 49 15	0 52 10	0 55 8	0 58 15
19	0 23 45	0 25 28	0 27 17	0 29 11	0 31 11	0 33 17	0 35 31	0 37 49	0 40 13	0 42 43	0 45 20	0 48 2	0 50 51	0 53 44	0 56 45
20	0 23 20	0 25 0	0 26 46	0 28 36	0 30 32	0 32 34	0 34 44	0 36 58	0 39 17	0 41 43	0 44 15	0 46 52	0 49 35	0 52 24	0 55 19
21	0 22 56	0 24 33	0 26 16	0 28 3	0 29 55	0 31 53	0 33 59	0 36 9	0 38 24	0 40 46	0 43 14	0 45 46	0 48 24	0 51 8	0 53 58
22	0 22 33	0 24 7	0 25 47	0 27 31	0 29 20	0 31 15	0 33 17	0 35 23	0 37 34	0 39 52	0 42 16	0 44 44	0 47 17	0 49 56	0 52 41
23	0 22 10	0 23 41	0 25 18	0 26 59	0 28 46	0 30 38	0 32 36	0 34 39	0 36 47	0 39 0	0 41 21	0 43 45	0 46 14	0 48 48	0 51 29

LATITUDE 16° NORTH OR SOUTH.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 54 59	2 1 27	2 8 5	2 14 52	2 21 50	2 28 56	2 36 11	2 43 36	2 51 10	2 58 53	3 6 42	3 14 42	3 22 47	3 31 3	3 39 25
1	1 49 37	1 55 47	2 2 7	2 8 42	2 15 20	2 22 10	2 29 6	2 36 12	2 43 26	2 50 50	2 58 19	3 5 58	3 13 44	3 21 39	3 29 40
2	1 44 42	1 50 35	1 56 39	2 2 58	2 9 20	2 15 52	2 22 30	2 29 18	2 36 14	2 43 18	2 50 29	2 57 49	3 5 17	3 12 52	3 20 34
3	1 40 12	1 45 49	1 51 38	1 57 43	2 3 49	2 10 0	2 16 21	2 22 52	2 29 31	2 36 17	2 43 11	2 50 14	2 57 25	3 4 42	3 12 7
4	1 36 4	1 41 26	1 47 1	1 52 50	1 58 41	2 4 33	2 10 38	2 16 54	2 23 17	2 29 46	2 36 24	2 43 11	2 50 6	2 57 7	3 4 16
5	1 32 15	1 37 24	1 42 46	1 48 18	1 53 54	1 59 30	2 5 20	2 11 22	2 17 30	2 23 44	2 30 7	2 36 39	2 43 19	2 50 5	2 56 59
6	1 28 43	1 33 39	1 38 48	1 44 6	1 49 29	1 54 51	2 0 28	2 6 16	2 12 10	2 18 11	2 24 20	2 30 37	2 37 1	2 43 32	2 50 12
7	1 25 28	1 30 13	1 35 10	1 40 15	1 45 25	1 50 35	1 56 0	2 1 35	2 7 16	2 13 5	2 19 1	2 25 5	2 31 15	2 37 32	2 43 59
8	1 22 29	1 27 4	1 31 50	1 36 43	1 41 41	1 46 40	1 51 54	1 57 17	2 2 46	2 8 23	2 14 7	2 19 58	2 25 55	2 31 59	2 38 13
9	1 19 45	1 24 10	1 28 45	1 33 26	1 38 13	1 43 6	1 48 9	1 53 20	1 58 37	2 4 2	2 9 34	2 15 13	2 20 58	2 26 49	2 32 50
10	1 17 15	1 21 31	1 25 55	1 30 25	1 35 2	1 39 48	1 44 41	1 49 41	1 54 48	2 0 1	2 5 21	2 10 49	2 16 23	2 22 2	2 27 50
11	1 14 53	1 19 0	1 23 16	1 27 37	1 32 5	1 36 41	1 41 24	1 46 13	1 51 10	1 56 13	2 1 21	2 6 38	2 12 0	2 17 28	2 23 7
12	1 12 38	1 16 36	1 20 44	1 24 57	1 29 17	1 33 44	1 38 18	1 42 57	1 47 44	1 52 37	1 57 35	2 2 42	2 7 54	2 13 12	2 18 40
13	1 10 30	1 14 19	1 18 20	1 22 25	1 26 37	1 30 55	1 35 20	1 39 49	1 44 27	1 49 11	1 54 0	1 58 57	2 4 0	2 9 8	2 14 26
14	1 8 29	1 12 9	1 16 3	1 20 1	1 24 5	1 28 14	1 32 30	1 36 50	1 41 19	1 45 54	1 50 35	1 55 23	2 0 17	2 5 16	2 10 23
15	1 6 34	1 10 6	1 13 53	1 17 44	1 21 40	1 25 41	1 29 48	1 34 0	1 38 20	1 42 46	1 47 19	1 51 58	1 56 43	2 1 33	2 6 30
16	1 4 45	1 8 11	1 11 50	1 15 34	1 19 22	1 23 16	1 27 15	1 31 20	1 35 33	1 39 50	1 44 14	1 48 44	1 53 20	1 58 1	2 2 48
17	1 3 1	1 6 21	1 9 53	1 13 30	1 17 11	1 20 58	1 24 50	1 28 48	1 32 54	1 37 4	1 41 20	1 45 41	1 50 9	1 54 42	1 59 20
18	1 1 22	1 4 37	1 8 2	1 11 32	1 15 7	1 18 47	1 22 32	1 26 24	1 30 23	1 34 26	1 38 35	1 42 48	1 47 8	1 51 34	1 56 4
19	0 59 48	1 2 58	1 6 16	1 9 40	1 13 9	1 16 43	1 20 22	1 24 8	1 28 0	1 31 56	1 35 58	1 40 4	1 44 17	1 48 36	1 52 59
20	0 58 19	1 1 24	1 4 35	1 7 53	1 11 16	1 14 44	1 18 18	1 21 58	1 25 43	1 29 32	1 33 27	1 37 28	1 41 34	1 45 46	1 50 3
21	0 56 54	0 59 54	1 2 59	1 6 11	1 9 28	1 12 51	1 16 19	1 19 53	1 23 32	1 27 15	1 31 3	1 34 57	1 38 57	1 43 2	1 47 12
22	0 55 32	0 58 27	1 1 28	1 4 34	1 7 45	1 11 3	1 14 25	1 17 53	1 21 26	1 25 3	1 28 45	1 32 32	1 36 25	1 40 24	1 44 27
23	0 54 14	0 57 4	1 0 0	1 3 0	1 6 6	1 9 19	1 12 35	1 15 56	1 19 23	1 22 55	1 26 31	1 30 12	1 33 59	1 37 51	1 41 48

Declination contrary name to Latitude

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	3 47 55	3 56 32	4 5 18	4 14 10	4 23 7	4 32 13	4 41 26	4 50 45	5 0 9	5 9 40	5 19 18	5 29 2	5 38 50	5 48 45	5 58 46
1	3 37 49	3 46 4	3 54 26	4 2 57	4 11 34	4 20 19	4 29 12	4 38 10	4 47 13	4 56 23	5 5 39	5 15 3	5 24 33	5 34 7	5 43 46
2	3 28 24	3 36 20	3 44 22	3 52 34	4 0 52	4 9 18	4 17 52	4 26 31	4 35 15	4 44 5	4 53 1	5 2 6	5 11 19	5 21 34	5 29 52
3	3 19 40	3 27 19	3 35 3	3 42 57	3 50 57	3 59 5	4 7 21	4 15 42	4 24 8	4 32 40	4 41 18	4 50 5	4 59 1	5 8 58	5 16 57
4	3 11 33	3 18 56	3 26 23	3 34 0	3 41 44	3 49 35	3 57 34	4 5 38	4 13 47	4 22 2	4 30 23	4 38 53	4 47 33	4 57 14	5 4 56
5	3 4 1	3 11 9	3 18 23	3 25 44	3 33 11	3 40 46	3 48 29	3 56 17	4 4 10	4 12 9	4 20 14	4 28 28	4 36 53	4 45 19	4 53 45
6	2 57 1	3 3 54	3 11 3	3 18 9	3 25 21	3 32 40	3 40 7	3 47 40	3 55 18	4 3 2	4 10 51	4 18 49	4 26 57	4 35 7	4 43 18
7	2 50 32	2 57 11	3 4 9	3 11 1	3 17 58	3 25 2	3 32 14	3 39 33	3 46 57	3 54 26	4 2 0	4 9 43	4 17 35	4 25 30	4 33 27
8	2 44 31	2 50 57	2 57 40	3 4 18	3 11 1	3 17 51	3 24 49	3 31 55	3 39 6	3 46 21	3 53 41	4 1 9	4 8 46	4 16 26	4 24 9
9	2 38 55	2 45 8	2 51 35	2 58 0	3 4 30	3 11 6	3 17 52	3 24 45	3 31 43	3 38 45	3 45 52	3 53 6	4 0 28	4 7 54	4 15 24
10	2 33 44	2 39 45	2 45 53	2 52 6	2 58 24	3 4 48	3 11 20	3 18 0	3 24 46	3 31 36	3 38 30	3 45 31	3 52 39	3 59 52	4 7 10
11	2 28 51	2 34 41	2 40 33	2 46 34	2 52 40	2 58 52	3 5 12	3 11 40	3 18 12	3 24 50	3 31 32	3 38 21	3 45 16	3 52 16	3 59 22
12	2 24 14	2 29 53	2 35 31	2 41 21	2 47 15	2 53 16	2 59 24	3 5 40	3 12 0	3 18 27	3 24 58	3 31 35	3 38 17	3 45 5	3 51 59
13	2 19 50	2 25 19	2 30 45	2 36 24	2 42 8	2 47 58	2 53 55	3 0 0	3 6 8	3 12 24	3 18 44	3 25 10	3 31 40	3 38 17	3 45 0
14	2 15 37	2 20 56	2 26 14	2 31 43	2 37 17	2 42 57	2 48 44	2 54 38	3 0 35	3 6 40	3 12 50	3 19 6	3 25 25	3 31 51	3 38 23
15	2 11 34	2 16 43	2 21 57	2 27 17	2 32 42	2 38 13	2 43 51	2 49 34	2 55 21	3 1 15	3 7 15	3 13 20	3 19 29	3 25 45	3 32 7
16	2 7 43	2 12 43	2 17 53	2 23 4	2 28 20	2 33 41	2 39 9	2 44 42	2 50 20	2 56 5	3 1 55	3 7 49	3 13 48	3 19 54	3 26 6
17	2 4 6	2 8 58	2 14 0	2 19 2	2 24 10	2 29 22	2 34 40	2 40 4	2 45 33	2 51 9	2 56 50	3 2 34	3 8 23	3 14 19	3 20 21
18	2 0 42	2 5 26	2 10 18	2 15 12	2 20 11	2 25 15	2 30 24	2 35 39	2 40 59	2 46 26	2 51 58	2 57 33	3 3 12	3 8 59	3 14 52
19	1 57 29	2 2 5	2 6 47	2 11 33	2 16 24	2 21 19	2 26 20	2 31 26	2 36 37	2 41 55	2 47 18	2 52 44	2 58 14	3 3 52	3 9 36
20	1 54 25	1 58 53	2 3 26	2 8 4	2 12 47	2 17 35	2 22 27	2 27 24	2 32 27	2 37 36	2 42 50	2 48 7	2 53 28	2 58 57	3 4 32
21	1 51 27	1 55 48	2 0 13	2 4 43	2 9 19	2 13 59	2 18 43	2 23 32	2 28 27	2 33 27	2 38 32	2 43 41	2 48 55	2 54 15	2 59 40
22	1 48 35	1 52 49	1 57 7	2 1 30	2 5 58	2 10 31	2 15 8	2 19 50	2 24 37	2 29 28	2 34 24	2 39 26	2 44 33	2 49 45	2 55 1
23	1 45 50	1 49 57	1 54 8	1 58 24	2 2 45	2 7 11	2 11 41	2 16 16	2 20 55	2 25 38	2 30 26	2 35 21	2 40 22	2 45 26	2 50 33

LATITUDE 17° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 11 3	0 11 23	0 11 54	0 12 39	0 13 38	0 14 48	0 16 12	0 17 47	0 19 36	0 21 38	0 23 48	0 26 15	0 28 53	0 31 43	0 34 46
1	0 11 5	0 11 26	0 12 0	0 12 48	0 13 50	0 15 5	0 16 32	0 18 16	0 20 12	0 22 20	0 24 39	0 27 15	0 30 0	0 33 1	0 36 13
2	0 11 7	0 11 30	0 12 7	0 12 57	0 14 2	0 15 22	0 16 53	0 18 45	0 20 48	0 23 4	0 25 33	0 28 19	0 31 12	0 34 26	0 37 49
3	0 11 10	0 11 34	0 12 14	0 13 6	0 14 14	0 15 40	0 17 15	0 19 15	0 21 25	0 23 50	0 26 30	0 29 28	0 32 31	0 35 59	0 39 35
4	0 11 11	0 11 35	0 12 15	0 13 12	0 14 29	0 16 1	0 17 45	0 19 48	0 22 12	0 24 45	0 27 37	0 30 43	0 34 8	0 37 45	0 41 38
5	0 11 12	0 11 37	0 12 22	0 13 24	0 14 45	0 16 24	0 18 19	0 20 33	0 23 7	0 25 51	0 28 56	0 32 18	0 35 55	0 39 51	0 44 0
6	0 11 13	0 11 42	0 12 31	0 13 38	0 15 9	0 16 53	0 18 57	0 21 25	0 24 8	0 27 12	0 30 32	0 34 8	0 38 5	0 42 20	0 46 47
7	0 11 17	0 11 46	0 12 39	0 13 53	0 15 32	0 17 29	0 19 45	0 22 23	0 25 25	0 28 41	0 32 22	0 36 17	0 40 39	0 45 11	0 50 2
8	0 11 19	0 11 51	0 12 53	0 14 11	0 16 0	0 18 5	0 20 38	0 23 31	0 26 47	0 30 30	0 34 29	0 38 53	0 43 26	0 48 34	0 53 53
9	0 11 21	0 11 57	0 13 1	0 14 37	0 16 39	0 18 58	0 21 49	0 25 2	0 28 45	0 32 49	0 37 15	0 42 4	0 47 18	0 52 49	0 58 45
10	0 11 24	0 12 9	0 13 22	0 15 9	0 17 27	0 20 8	0 23 22	0 26 55	0 31 8	0 35 41	0 40 40	0 46 4	0 51 53	0 58 7	1 4 38
11	0 11 28	0 12 17	0 13 40	0 15 37	0 18 20	0 21 29	0 25 11	0 29 17	0 34 4	0 39 22	0 45 1	0 51 11	0 57 45	1 4 39	1 11 58
12	0 11 32	0 12 32	0 14 16	0 16 40	0 19 45	0 23 30	0 27 48	0 32 46	0 38 28	0 44 25	0 50 59	0 58 2	1 5 40	1 13 31	1 21 48
13	0 11 38	0 12 49	0 14 57	0 17 52	0 21 47	0 26 27	0 31 40	0 37 38	0 44 21	0 51 36	0 59 13	1 7 33	1 16 15	1 25 29	1 34 51
14	0 11 44	0 13 30	0 16 14	0 19 58	0 24 58	0 30 55	0 37 39	0 44 58	0 53 18	1 2 1	1 11 22	1 20 56	1 31 28	1 41 53	1 52 56
15	0 12 13	0 14 37	0 18 42	0 24 13	0 30 58	0 38 58	0 47 58	0 57 32	1 8 7	1 18 43	1 29 59	1 41 15	1 53 47	2 6 9	2 18 29
16	0 12 50	0 17 45	0 24 50	0 34 14	0 45 1	0 56 20	1 8 29	1 20 45	1 33 48	1 47 4	2 0 23	2 13 46	2 27 41	2 41 15	2 55 10
17	Not calculable.														
18	0 12 45	0 17 38	0 24 45	0 33 54	0 44 38	0 56 1	1 8 1	1 20 17	1 33 23	1 46 23	1 59 38	2 12 51	2 26 46	2 40 16	2 54 3
19	0 11 50	0 14 32	0 18 37	0 23 50	0 30 44	0 38 37	0 47 22	0 56 47	1 6 58	1 17 40	1 28 45	1 40 15	1 52 6	2 4 15	2 16 35
20	0 11 42	0 13 25	0 15 58	0 19 46	0 24 42	0 30 22	0 36 49	0 43 58	0 52 12	1 0 36	1 9 42	1 19 12	1 29 19	1 39 37	1 50 17
21	0 11 36	0 12 45	0 14 49	0 17 42	0 21 30	0 25 45	0 30 47	0 36 33	0 42 59	0 49 57	0 57 27	1 5 21	1 13 44	1 22 38	1 31 49
22	0 11 28	0 12 28	0 14 10	0 16 25	0 19 23	0 22 55	0 26 57	0 31 41	0 36 57	0 42 45	0 48 59	0 55 45	1 3 0	1 10 34	1 18 31
23	0 11 24	0 12 14	0 13 37	0 15 32	0 17 53	0 20 53	0 24 24	0 28 20	0 32 51	0 37 44	0 43 3	0 48 49	0 55 9	1 1 39	1 8 37

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 11 3	0 11 23	0 11 54	0 12 39	0 13 38	0 14 48	0 16 12	0 17 47	0 19 36	0 21 38	0 23 48	0 26 15	0 28 53	0 31 43	0 34 46
1	0 11 1	0 11 20	0 11 50	0 12 33	0 13 29	0 14 36	0 15 54	0 17 24	0 19 7	0 21 2	0 23 6	0 25 25	0 27 55	0 30 38	0 33 32
2	0 10 59	0 11 17	0 11 46	0 12 27	0 13 20	0 14 24	0 15 37	0 17 3	0 18 40	0 20 28	0 22 28	0 24 39	0 27 2	0 29 38	0 32 23
3	0 10 58	0 11 15	0 11 42	0 12 21	0 13 12	0 14 13	0 15 22	0 16 44	0 18 16	0 19 57	0 21 53	0 23 57	0 26 13	0 28 42	0 31 19
4	0 10 57	0 11 13	0 11 38	0 12 15	0 13 4	0 14 2	0 15 8	0 16 26	0 17 54	0 19 29	0 21 21	0 23 19	0 25 29	0 27 51	0 30 20
5	0 10 56	0 11 11	0 11 34	0 12 10	0 12 56	0 13 51	0 14 54	0 16 9	0 17 34	0 19 3	0 20 52	0 22 45	0 24 49	0 27 4	0 29 26
6	0 10 54	0 11 9	0 11 31	0 12 5	0 12 49	0 13 42	0 14 42	0 15 53	0 17 16	0 18 42	0 20 25	0 22 13	0 24 12	0 26 22	0 28 37
7	0 10 53	0 11 7	0 11 28	0 12 1	0 12 43	0 13 34	0 14 32	0 15 39	0 16 59	0 18 22	0 20 0	0 21 44	0 23 38	0 25 43	0 27 52
8	0 10 52	0 11 5	0 11 25	0 11 57	0 12 37	0 13 26	0 14 22	0 15 26	0 16 43	0 18 4	0 19 37	0 21 17	0 23 7	0 25 7	0 27 11
9	0 10 51	0 11 3	0 11 23	0 11 53	0 12 31	0 13 18	0 14 13	0 15 15	0 16 28	0 17 47	0 19 16	0 20 52	0 22 38	0 24 33	0 26 33
10	0 10 50	0 11 1	0 11 21	0 11 50	0 12 26	0 13 11	0 14 5	0 15 5	0 16 14	0 17 31	0 18 57	0 20 29	0 22 11	0 24 1	0 25 57
11	0 10 49	0 11 0	0 11 19	0 11 46	0 12 21	0 13 4	0 13 57	0 14 55	0 16 1	0 17 15	0 18 38	0 20 7	0 21 45	0 23 31	0 25 23
12	0 10 48	0 10 58	0 11 17	0 11 42	0 12 16	0 12 58	0 13 49	0 14 45	0 15 49	0 17 0	0 18 20	0 19 46	0 21 21	0 23 3	0 24 51
13	0 10 47	0 10 56	0 11 15	0 11 38	0 12 11	0 12 52	0 13 42	0 14 36	0 15 37	0 16 46	0 18 3	0 19 26	0 20 58	0 22 37	0 24 22
14	0 10 45	0 10 54	0 11 13	0 11 34	0 12 7	0 12 46	0 13 35	0 14 27	0 15 26	0 16 33	0 17 47	0 19 7	0 20 36	0 22 12	0 23 54
15	0 10 43	0 10 52	0 11 11	0 11 30	0 12 3	0 12 40	0 13 28	0 14 18	0 15 15	0 16 20	0 17 32	0 18 49	0 20 15	0 21 48	0 23 27
16	0 10 41	0 10 50	0 11 8	0 11 27	0 11 59	0 12 35	0 13 21	0 14 9	0 15 5	0 16 8	0 17 17	0 18 32	0 19 55	0 21 25	0 23 1
17	0 10 39	0 10 48	0 11 5	0 11 24	0 11 55	0 12 30	0 13 14	0 14 1	0 14 55	0 15 56	0 17 3	0 18 16	0 19 36	0 21 3	0 22 36
18	0 10 37	0 10 46	0 11 2	0 11 21	0 11 51	0 12 25	0 13 7	0 13 53	0 14 45	0 15 44	0 16 49	0 18 0	0 19 18	0 20 42	0 22 12
19	0 10 35	0 10 44	0 10 59	0 11 18	0 11 47	0 12 20	0 13 0	0 13 45	0 14 36	0 15 33	0 16 36	0 17 45	0 19 1	0 20 22	0 21 49
20	0 10 33	0 10 42	0 10 56	0 11 15	0 11 43	0 12 15	0 12 53	0 13 37	0 14 27	0 15 22	0 16 23	0 17 31	0 18 45	0 20 3	0 21 27
21	0 10 31	0 10 40	0 10 53	0 11 12	0 11 39	0 12 10	0 12 47	0 13 29	0 14 18	0 15 12	0 16 11	0 17 17	0 18 29	0 19 45	0 21 6
22	0 10 29	0 10 38	0 10 50	0 11 9	0 11 35	0 12 5	0 12 41	0 13 22	0 14 10	0 15 2	0 16 0	0 17 3	0 18 13	0 19 27	0 20 46
23	0 10 27	0 10 35	0 10 48	0 11 6	0 11 31	0 12 0	0 12 35	0 13 15	0 14 2	0 14 53	0 15 49	0 16 50	0 17 58	0 19 10	0 20 28

LATITUDE 17° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 38 0	0 41 27	0 45 4	0 48 54	0 52 55	0 57 7	1 1 30	1 6 6	1 10 52	1 15 47	1 20 56	1 26 13	1 31 40	1 37 18	1 43 7
1	0 39 37	0 43 15	0 47 5	0 51 6	0 55 20	0 59 45	1 4 22	1 9 12	1 14 12	1 19 23	1 24 46	1 30 18	1 36 1	1 41 55	1 48 0
2	0 41 25	0 45 17	0 49 22	0 53 36	0 58 5	1 2 45	1 7 38	1 12 45	1 18 0	1 23 29	1 29 9	1 34 59	1 41 1	1 47 14	1 53 38
3	0 43 25	0 47 33	0 51 55	0 56 24	1 1 12	1 6 11	1 11 23	1 16 47	1 22 22	1 28 12	1 34 11	1 40 24	1 46 49	1 53 24	2 0 11
4	0 45 45	0 50 8	0 54 46	0 59 36	1 4 41	1 10 2	1 15 30	1 21 18	1 27 14	1 33 25	1 39 47	1 46 23	1 53 6	2 0 8	2 7 16
5	0 48 26	0 53 12	0 58 6	1 3 17	1 8 43	1 14 22	1 20 15	1 26 24	1 32 44	1 39 20	1 46 7	1 53 6	2 0 17	2 7 43	2 15 15
6	0 51 36	0 56 42	1 1 57	1 7 34	1 13 23	1 19 27	1 25 49	1 32 21	1 39 9	1 46 11	1 53 24	2 0 50	2 8 21	2 16 19	2 24 24
7	0 55 15	1 0 44	1 6 30	1 12 30	1 18 46	1 25 25	1 32 9	1 39 15	1 46 31	1 54 1	2 1 48	2 9 45	2 17 50	2 26 20	2 34 49
8	0 59 28	1 5 32	1 11 45	1 18 15	1 25 12	1 32 15	1 39 33	1 47 14	1 55 9	2 3 17	2 11 35	2 20 7	2 28 49	2 37 48	2 46 56
9	1 4 57	1 11 33	1 18 20	1 25 33	1 32 54	1 40 41	1 48 43	1 56 54	2 5 26	2 14 8	2 23 7	2 32 16	2 41 36	2 51 14	3 0 57
10	1 11 30	1 18 45	1 26 19	1 34 14	1 42 22	1 50 53	1 59 32	2 8 34	2 17 40	2 27 14	2 36 46	2 46 41	2 56 43	3 6 58	3 17 24
11	1 19 47	1 28 1	1 36 14	1 44 46	1 53 47	2 3 20	2 12 45	2 23 32	2 32 32	2 42 46	2 53 15	3 3 50	3 14 40	3 25 33	3 36 52
12	1 30 33	1 39 42	1 48 58	1 58 43	2 8 40	2 18 51	2 29 18	2 40 1	2 50 52	3 2 4	3 13 16	3 24 43	3 36 18	3 48 5	3 59 57
13	1 44 47	1 55 1	2 5 41	2 16 20	2 27 22	2 38 39	2 50 7	3 1 47	3 13 34	3 25 42	3 37 43	3 50 1	4 2 24	4 14 51	4 27 34
14	2 4 12	2 15 47	2 27 32	2 39 32	2 51 42	3 4 4	3 16 36	3 29 6	3 41 56	3 54 50	4 7 52	4 20 50	4 34 0	4 47 18	5 0 36
15	2 31 13	2 44 4	2 57 9	3 10 18	3 23 28	3 36 55	3 50 19	4 3 52	4 17 26	4 31 3	4 44 51	4 58 32	5 12 19	5 26 7	5 39 58
16	3 9 3	3 22 55	3 36 58	3 50 55	4 5 2	4 19 1	4 33 16	4 47 25	5 1 32	5 15 42	5 29 54	5 44 4	5 58 19	6 12 33	6 26 45
17	Not calculable.														
18	3 7 51	3 21 41	3 35 39	3 49 36	4 3 36	4 17 34	4 31 41	4 45 41	4 59 44	5 13 46	5 27 59	5 42 1	5 56 11	6 10 23	6 24 30
19	2 28 57	2 41 45	2 54 42	3 7 15	3 20 37	3 33 49	3 47 15	4 0 33	4 13 51	4 27 26	4 41 1	4 54 37	5 8 12	5 21 49	5 35 42
20	2 1 17	2 12 39	2 24 14	2 35 50	2 47 43	2 59 54	3 12 13	3 24 33	3 37 2	3 49 40	4 2 31	4 15 18	4 28 5	4 41 6	4 54 17
21	1 41 26	1 51 29	2 1 33	2 11 53	2 22 37	2 33 37	2 44 47	2 56 9	3 7 35	3 19 12	3 30 59	3 42 59	3 55 4	4 7 11	4 19 31
22	1 25 46	1 35 33	1 44 31	1 53 45	2 3 21	2 13 10	2 23 16	2 33 33	2 43 58	2 54 39	3 5 33	3 16 32	3 27 41	3 39 1	3 50 36
23	1 15 48	1 23 30	1 31 28	1 39 42	1 48 15	1 57 5	2 6 12	2 15 31	2 24 56	2 34 43	2 44 44	2 54 51	3 5 8	3 15 36	3 26 14

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 38 0	0 41 27	0 45 4	0 48 54	0 52 55	0 57 7	1 1 30	1 6 6	1 10 52	1 15 47	1 20 56	1 26 13	1 31 40	1 37 18	1 43 7
1	0 36 36	0 39 54	0 43 18	0 46 58	0 50 46	0 54 46	0 58 56	1 3 18	1 7 50	1 12 32	1 17 25	1 22 27	1 27 36	1 32 59	1 38 31
2	0 35 18	0 38 27	0 41 41	0 45 10	0 48 47	0 52 36	0 56 34	1 0 44	1 5 3	1 9 32	1 14 11	1 19 0	1 23 53	1 29 2	1 34 18
3	0 34 6	0 37 6	0 40 11	0 43 30	0 46 57	0 50 36	0 54 23	0 58 22	1 2 29	1 6 46	1 11 13	1 15 49	1 20 27	1 25 23	1 30 25
4	0 32 59	0 35 51	0 38 48	0 41 58	0 45 16	0 48 45	0 52 22	0 56 11	1 0 7	1 4 13	1 8 29	1 12 53	1 17 17	1 22 1	1 26 50
5	0 31 58	0 34 42	0 37 32	0 40 33	0 43 43	0 47 3	0 50 31	0 54 10	0 57 56	1 1 52	1 5 58	1 10 11	1 14 32	1 19 5	1 23 42
6	0 31 2	0 33 39	0 36 23	0 39 16	0 42 17	0 45 30	0 48 50	0 52 21	0 55 57	0 59 44	1 3 40	1 7 43	1 11 53	1 16 13	1 20 39
7	0 30 11	0 32 42	0 35 20	0 38 6	0 40 59	0 44 5	0 47 18	0 50 41	0 54 8	0 57 46	1 1 32	1 5 25	1 9 26	1 13 35	1 17 51
8	0 29 25	0 31 49	0 34 21	0 37 1	0 39 47	0 42 46	0 45 52	0 49 7	0 52 26	0 55 56	0 59 33	1 3 17	1 7 10	1 11 9	1 15 16
9	0 28 42	0 31 0	0 33 26	0 36 1	0 38 41	0 41 33	0 44 32	0 47 39	0 50 51	0 54 14	0 57 43	1 1 19	1 5 4	1 8 55	1 12 54
10	0 28 2	0 30 15	0 32 35	0 35 5	0 37 40	0 40 25	0 43 17	0 46 17	0 49 23	0 52 40	0 56 1	0 59 30	1 3 8	1 6 52	1 10 44
11	0 27 23	0 29 32	0 31 46	0 34 11	0 36 41	0 39 20	0 42 7	0 45 1	0 48 1	0 51 11	0 54 25	0 57 48	1 1 19	1 4 57	1 8 42
12	0 26 47	0 28 51	0 31 0	0 33 20	0 35 45	0 38 19	0 41 1	0 43 50	0 46 44	0 49 47	0 52 55	0 56 12	0 59 37	1 3 9	1 6 47
13	0 26 14	0 28 13	0 30 17	0 32 32	0 34 53	0 37 22	0 39 59	0 42 43	0 45 31	0 48 28	0 51 30	0 54 41	0 58 0	1 1 26	1 4 57
14	0 25 43	0 27 37	0 29 37	0 31 47	0 34 4	0 36 28	0 39 0	0 41 39	0 44 22	0 47 13	0 50 9	0 53 14	0 56 27	0 59 47	1 3 11
15	0 25 13	0 27 3	0 28 59	0 31 5	0 33 18	0 35 37	0 38 4	0 40 38	0 43 16	0 46 2	0 48 52	0 51 51	0 54 58	0 58 12	1 1 29
16	0 24 44	0 26 30	0 28 23	0 30 25	0 32 34	0 34 49	0 37 11	0 39 40	0 42 13	0 44 54	0 47 39	0 50 32	0 53 33	0 56 41	0 59 51
17	0 24 16	0 25 59	0 27 49	0 29 47	0 31 52	0 34 3	0 36 21	0 38 45	0 41 13	0 43 49	0 46 29	0 49 16	0 52 11	0 55 13	0 58 18
18	0 23 49	0 25 30	0 27 17	0 29 11	0 31 12	0 33 19	0 35 33	0 37 52	0 40 16	0 42 47	0 45 22	0 48 4	0 50 53	0 53 49	0 56 49
19	0 23 23	0 25 2	0 26 46	0 28 37	0 30 34	0 32 37	0 34 47	0 37 1	0 39 21	0 41 47	0 44 18	0 46 56	0 49 39	0 52 29	0 55 24
20	0 22 58	0 24 35	0 26 17	0 28 4	0 29 57	0 31 57	0 34 2	0 36 12	0 38 28	0 40 49	0 43 17	0 45 51	0 48 28	0 51 13	0 54 3
21	0 22 35	0 24 9	0 25 48	0 27 32	0 29 22	0 31 18	0 33 20	0 35 26	0 37 38	0 39 56	0 42 19	0 44 49	0 47 21	0 50 2	0 52 46
22	0 22 13	0 23 43	0 25 20	0 27 1	0 28 48	0 30 41	0 32 40	0 34 42	0 36 50	0 39 5	0 41 24	0 43 49	0 46 18	0 49 50	0 51 33
23	0 21 51	0 23 18	0 24 53	0 26 31	0 28 15	0 30 5	0 32 0	0 34 0	0 36 4	0 38 15	0 40 31	0 42 52	0 45 17	0 47 50	0 50 24

LATITUDE 17° NORTH OR SOUTH.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 49 5	1 55 14	2 1 31	2 7 58	2 14 35	2 21 20	2 28 14	2 35 17	2 42 30	2 49 51	2 57 18	3 4 56	3 12 40	3 20 32	3 28 33
1	1 44 14	1 50 5	1 56 6	2 2 17	2 8 36	2 15 4	2 21 41	2 28 26	2 35 20	2 42 21	2 49 30	2 56 50	3 4 16	3 11 52	3 19 33
2	1 39 46	1 45 22	1 51 9	1 57 4	2 3 7	2 9 18	2 15 38	2 22 6	2 28 43	2 35 28	2 42 21	2 49 23	2 56 32	3 3 47	3 11 11
3	1 35 39	1 41 1	1 46 34	1 52 15	1 58 3	2 3 59	2 10 5	2 16 18	2 22 39	2 29 8	2 35 45	2 42 31	2 49 24	2 56 17	3 3 26
4	1 31 54	1 37 3	1 42 22	1 47 50	1 53 25	1 59 7	2 4 58	2 10 57	2 17 4	2 23 18	2 29 40	2 36 11	2 42 48	2 49 27	2 56 20
5	1 28 29	1 33 26	1 38 32	1 43 47	1 49 9	1 54 37	2 0 14	2 6 0	2 11 53	2 17 53	2 24 1	2 30 18	2 36 40	2 43 9	2 49 47
6	1 25 22	1 30 6	1 35 0	1 40 2	1 45 12	1 50 27	1 55 52	2 1 25	2 7 5	2 12 52	2 18 47	2 24 50	2 30 58	2 37 16	2 43 40
7	1 22 22	1 26 59	1 31 43	1 36 33	1 41 31	1 46 35	1 51 49	1 57 10	2 2 38	2 8 13	2 13 55	2 19 44	2 25 41	2 31 44	2 37 56
8	1 19 36	1 24 3	1 28 36	1 33 17	1 38 5	1 42 58	1 48 1	1 53 11	1 58 27	2 3 50	2 9 21	2 14 59	2 20 44	2 26 33	2 32 33
9	1 17 4	1 21 20	1 25 43	1 30 14	1 34 52	1 39 36	1 44 28	1 49 27	1 54 33	1 59 45	2 5 5	2 10 32	2 16 5	2 21 43	2 27 31
10	1 14 44	1 18 50	1 23 4	1 27 24	1 31 52	1 36 27	1 41 9	1 45 58	1 50 54	1 55 56	2 1 6	2 6 22	2 11 44	2 17 12	2 22 49
11	1 12 34	1 16 30	1 20 35	1 24 44	1 29 4	1 33 31	1 38 4	1 42 44	1 47 30	1 52 21	1 57 21	2 2 26	2 7 38	2 12 57	2 18 23
12	1 10 30	1 14 17	1 18 13	1 22 13	1 26 25	1 30 44	1 35 9	1 39 40	1 44 17	1 48 59	1 53 48	1 58 43	2 3 46	2 8 55	2 14 11
13	1 8 31	1 12 10	1 15 58	1 19 50	1 23 54	1 28 5	1 32 22	1 36 49	1 41 13	1 45 47	1 50 26	1 55 12	2 0 6	2 5 6	2 10 12
14	1 6 37	1 10 8	1 13 49	1 17 35	1 21 31	1 25 34	1 29 43	1 34 2	1 38 18	1 42 44	1 47 15	1 51 53	1 56 38	2 1 29	2 6 26
15	1 4 47	1 8 11	1 11 46	1 15 27	1 19 16	1 23 11	1 27 12	1 31 19	1 35 31	1 39 50	1 44 14	1 48 45	1 53 21	1 58 4	2 2 52
16	1 3 3	1 6 22	1 9 51	1 13 25	1 17 7	1 20 54	1 24 48	1 28 48	1 32 52	1 37 4	1 41 21	1 45 45	1 50 13	1 54 49	1 59 28
17	1 1 25	1 4 39	1 8 2	1 11 29	1 15 4	1 18 45	1 22 32	1 26 25	1 30 22	1 34 26	1 38 36	1 42 53	1 47 14	1 51 42	1 56 13
18	0 59 52	1 3 1	1 6 18	1 9 39	1 13 8	1 16 43	1 20 23	1 24 9	1 27 59	1 31 56	1 35 59	1 40 9	1 44 23	1 48 43	1 53 7
19	0 58 23	1 1 28	1 4 39	1 7 55	1 11 18	1 14 47	1 18 21	1 22 0	1 25 44	1 29 34	1 33 30	1 37 33	1 41 40	1 45 52	1 50 9
20	0 56 57	0 59 58	1 3 5	1 6 17	1 9 34	1 12 57	1 16 25	1 19 58	1 23 36	1 27 20	1 31 9	1 35 5	1 39 5	1 43 9	1 47 19
21	0 55 36	0 58 32	1 1 34	1 4 41	1 7 53	1 11 11	1 14 32	1 17 59	1 21 31	1 25 10	1 28 53	1 32 42	1 36 36	1 40 33	1 44 36
22	0 54 19	0 57 10	1 0 6	1 3 8	1 6 15	1 9 28	1 12 44	1 16 5	1 19 31	1 23 5	1 26 42	1 30 24	1 34 12	1 38 3	1 42 0
23	0 53 4	0 55 51	0 58 42	1 1 39	1 4 41	1 7 49	1 11 0	1 14 15	1 17 36	1 21 4	1 24 35	1 28 10	1 31 52	1 35 39	1 39 30

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	3 36 41	3 44 56	3 53 20	4 1 49	4 10 24	4 19 8	4 27 58	4 36 55	4 45 58	4 55 8	5 4 23	5 13 45	5 23 11	5 32 45	5 42 23
1	3 27 22	3 35 18	3 43 23	3 51 33	3 59 50	4 8 15	4 16 46	4 25 23	4 34 6	4 42 58	4 51 56	5 0 58	5 10 5	5 19 18	5 28 36
2	3 18 43	3 26 22	3 34 9	3 42 2	3 50 2	3 58 8	4 6 20	4 14 38	4 23 3	4 31 38	4 40 20	4 49 4	4 57 52	5 6 46	5 15 46
3	3 10 42	3 18 5	3 25 35	3 33 11	3 40 54	3 48 44	3 56 40	4 4 42	4 12 48	4 21 5	4 29 29	4 37 57	4 46 30	4 55 8	5 3 51
4	3 3 20	3 10 27	3 17 41	3 25 0	3 32 26	3 40 0	3 47 41	3 55 27	4 3 19	4 11 18	4 19 24	4 27 37	4 35 56	4 44 19	4 52 46
5	2 56 33	3 3 25	3 10 23	3 17 26	3 24 36	3 31 55	3 39 22	3 46 53	3 54 30	4 2 13	4 10 2	4 18 1	4 26 6	4 34 14	4 42 26
6	2 50 11	2 56 49	3 3 33	3 10 22	3 17 18	3 24 21	3 31 34	3 38 51	3 46 14	3 53 43	4 1 18	4 9 0	4 16 49	4 24 42	4 32 39
7	2 44 14	2 50 38	2 57 9	3 3 46	3 10 30	3 17 19	3 24 15	3 31 19	3 38 30	3 45 45	3 53 6	4 0 32	4 8 5	4 15 43	4 23 25
8	2 38 48	2 44 50	2 51 9	2 57 33	3 4 5	3 10 41	3 17 24	3 24 14	3 31 11	3 38 14	3 45 23	3 52 35	3 59 54	4 7 18	4 14 48
9	2 33 35	2 39 25	2 45 32	2 51 44	2 58 3	3 4 27	3 10 58	3 17 34	3 24 17	3 31 9	3 38 6	3 45 6	3 52 12	3 59 23	4 6 41
10	2 28 32	2 34 20	2 40 15	2 46 15	2 52 22	2 58 34	3 4 53	3 11 17	3 17 47	3 24 27	3 31 13	3 38 2	3 44 56	3 51 55	3 59 0
11	2 23 56	2 29 33	2 35 17	2 41 5	2 46 59	2 52 59	2 59 8	3 5 21	3 11 40	3 18 8	3 24 41	3 31 17	3 37 58	3 44 49	3 51 41
12	2 19 34	2 25 0	2 30 34	2 36 11	2 41 54	2 47 43	2 53 42	2 59 45	3 5 53	3 12 10	3 18 30	3 24 54	3 31 23	3 38 3	3 44 44
13	2 15 25	2 20 42	2 26 6	2 31 33	2 37 6	2 42 45	2 48 34	2 54 27	3 0 25	3 6 31	3 12 40	3 18 53	3 25 10	3 31 37	3 38 8
14	2 11 29	2 16 37	2 21 52	2 27 10	2 32 34	2 38 4	2 43 43	2 49 26	2 55 14	3 1 9	3 7 8	3 13 10	3 19 16	3 25 31	3 31 52
15	2 7 46	2 12 45	2 17 50	2 23 0	2 28 16	2 33 38	2 39 7	2 44 40	2 50 18	2 56 2	3 1 52	3 7 44	3 13 40	3 19 45	3 25 56
16	2 4 13	2 9 3	2 13 59	2 19 1	2 24 10	2 29 24	2 34 44	2 40 8	2 45 36	2 51 10	2 56 51	3 2 34	3 8 19	3 14 14	3 20 15
17	2 0 50	2 5 32	2 10 20	2 15 14	2 20 15	2 25 21	2 30 32	2 35 47	2 41 6	2 46 31	2 52 3	2 57 37	3 3 13	3 8 58	3 14 49
18	1 57 36	2 2 11	2 6 52	2 11 38	2 16 31	2 21 28	2 26 30	2 31 36	2 36 47	2 42 3	2 47 26	2 52 52	2 58 20	3 3 56	3 9 37
19	1 54 31	1 58 59	2 3 33	2 8 11	2 12 55	2 17 44	2 22 37	2 27 35	2 32 38	2 37 46	2 43 0	2 48 19	2 53 39	2 59 6	3 4 38
20	1 51 34	1 55 55	2 0 22	2 4 53	2 9 28	2 14 8	2 18 53	2 23 43	2 28 39	2 33 40	2 38 46	2 43 56	2 49 9	2 54 27	2 59 50
21	1 48 44	1 52 58	1 57 18	2 1 42	2 6 10	2 10 42	2 15 19	2 20 2	2 24 50	2 29 43	2 34 41	2 39 43	2 44 50	2 50 1	2 55 16
22	1 46 1	1 50 8	1 54 21	1 58 38	2 2 59	2 7 24	2 11 55	2 16 31	2 21 11	2 25 56	2 30 45	2 35 40	2 40 41	2 45 45	2 50 52
23	1 43 25	1 47 26	1 51 32	1 55 42	1 59 56	2 4 15	2 8 39	2 13 8	2 17 41	2 22 17	2 26 58	2 31 47	2 36 42	2 41 39	2 46 38

LATITUDE 18° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 11 2	0 11 20	0 11 50	0 12 33	0 13 27	0 14 33	0 15 59	0 17 22	0 19 4	0 20 59	0 23 3	0 25 22	0 27 50	0 30 30	0 33 22
1	0 11 4	0 11 23	0 11 55	0 12 40	0 13 38	0 14 45	0 16 13	0 17 44	0 19 32	0 21 35	0 23 46	0 26 18	0 28 49	0 31 37	0 34 35
2	0 11 6	0 11 26	0 12 0	0 12 48	0 13 49	0 14 59	0 16 29	0 18 8	0 20 3	0 22 14	0 24 33	0 27 18	0 29 53	0 32 50	0 36 0
3	0 11 8	0 11 30	0 12 6	0 12 56	0 14 1	0 15 15	0 16 49	0 18 36	0 20 37	0 22 57	0 25 24	0 28 23	0 31 2	0 34 10	0 37 37
4	0 11 9	0 11 33	0 12 10	0 13 4	0 14 14	0 15 34	0 17 13	0 19 8	0 21 18	0 23 45	0 26 23	0 29 27	0 32 23	0 35 44	0 39 22
5	0 11 10	0 11 36	0 12 15	0 13 12	0 14 27	0 15 56	0 17 42	0 19 45	0 22 6	0 24 39	0 27 31	0 30 35	0 33 59	0 37 34	0 41 26
6	0 11 11	0 11 39	0 12 22	0 13 23	0 14 45	0 16 21	0 18 16	0 20 30	0 22 59	0 25 45	0 28 50	0 32 7	0 35 48	0 39 38	0 43 46
7	0 11 13	0 11 42	0 12 30	0 13 38	0 15 9	0 16 49	0 18 54	0 21 21	0 23 58	0 27 3	0 30 21	0 33 52	0 37 51	0 42 2	0 46 30
8	0 11 17	0 11 45	0 12 38	0 13 52	0 15 32	0 17 25	0 19 42	0 22 18	0 25 17	0 28 35	0 32 11	0 36 7	0 40 22	0 44 56	0 49 45
9	0 11 18	0 11 50	0 12 48	0 14 13	0 15 58	0 18 7	0 20 37	0 23 30	0 26 48	0 30 24	0 34 24	0 38 39	0 43 25	0 48 22	0 53 39
10	0 11 20	0 11 56	0 13 1	0 14 36	0 16 36	0 18 56	0 21 45	0 24 57	0 28 40	0 32 38	0 37 2	0 41 49	0 47 2	0 52 31	0 58 23
11	0 11 24	0 12 9	0 13 22	0 14 58	0 17 21	0 20 1	0 23 14	0 26 49	0 30 55	0 35 32	0 40 26	0 45 46	0 51 35	0 57 44	1 4 11
12	0 11 28	0 12 18	0 13 42	0 15 41	0 18 20	0 21 32	0 25 9	0 29 16	0 33 57	0 39 12	0 44 47	0 50 53	0 57 24	1 4 20	1 12 35
13	0 11 32	0 12 32	0 14 14	0 16 37	0 19 40	0 23 25	0 27 41	0 32 37	0 38 16	0 44 4	0 50 41	0 57 39	1 5 12	1 12 52	1 21 15
14	0 11 38	0 12 49	0 14 55	0 17 49	0 21 42	0 26 16	0 31 30	0 37 24	0 44 4	0 51 7	0 58 47	1 6 59	1 15 40	1 24 46	1 34 11
15	0 11 44	0 13 30	0 16 14	0 19 55	0 24 58	0 30 44	0 37 22	0 44 44	0 52 49	1 1 42	1 10 49	1 20 38	1 30 44	1 41 12	1 52 5
16	0 11 50	0 14 32	0 18 37	0 24 13	0 30 58	0 38 47	0 47 42	0 57 7	1 7 32	1 18 13	1 29 31	1 40 56	1 52 56	2 5 13	2 17 32
17	0 12 45	0 17 38	0 24 45	0 33 54	0 44 38	0 56 1	1 8 1	1 20 17	1 33 23	1 46 23	1 59 38	2 12 51	2 26 46	2 40 16	2 54 3
18	Not calculable.														
19	0 12 45	0 17 38	0 24 38	0 33 45	0 44 14	0 55 29	1 7 29	1 19 43	1 32 33	1 45 38	1 58 43	2 11 57	2 25 44	2 39 7	2 52 48
20	0 11 50	0 14 32	0 18 32	0 23 44	0 30 44	0 38 16	0 46 54	0 56 13	1 6 37	1 16 53	1 27 56	1 39 23	1 51 13	2 3 13	2 15 26
21	0 11 42	0 13 22	0 15 58	0 19 44	0 24 39	0 30 14	0 36 36	0 43 42	0 51 36	1 0 5	1 9 1	1 18 31	1 28 31	1 38 43	1 49 19
22	0 11 33	0 12 45	0 14 47	0 17 40	0 21 18	0 25 40	0 30 38	0 36 18	0 42 45	0 49 36	0 56 57	1 4 45	1 12 58	1 21 46	1 30 53
23	0 11 28	0 12 25	0 13 59	0 16 23	0 19 14	0 22 43	0 26 45	0 31 30	0 36 43	0 42 23	0 48 34	0 55 14	1 2 23	1 9 52	1 17 41

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 11 2	0 11 20	0 11 50	0 12 33	0 13 27	0 14 33	0 15 59	0 17 22	0 19 4	0 20 59	0 23 3	0 25 22	0 27 50	0 30 30	0 33 22
1	0 11 0	0 11 17	0 11 46	0 12 27	0 13 17	0 14 21	0 15 40	0 17 0	0 18 38	0 20 27	0 22 26	0 24 37	0 26 58	0 29 30	0 32 14
2	0 10 58	0 11 15	0 11 42	0 12 21	0 13 8	0 14 9	0 15 23	0 16 41	0 18 15	0 19 58	0 21 51	0 23 56	0 26 11	0 28 36	0 31 12
3	0 10 57	0 11 13	0 11 38	0 12 15	0 13 0	0 13 58	0 15 8	0 16 24	0 17 53	0 19 31	0 21 19	0 23 19	0 25 29	0 27 46	0 30 15
4	0 10 56	0 11 11	0 11 34	0 12 10	0 12 53	0 13 48	0 14 54	0 16 8	0 17 33	0 19 6	0 20 50	0 22 44	0 24 49	0 27 0	0 29 22
5	0 10 55	0 11 9	0 11 31	0 12 5	0 12 47	0 13 39	0 14 41	0 15 53	0 17 15	0 18 43	0 20 23	0 22 12	0 24 12	0 26 17	0 28 33
6	0 10 52	0 11 7	0 11 28	0 12 1	0 12 41	0 13 31	0 14 29	0 15 39	0 16 58	0 18 22	0 19 58	0 21 43	0 23 37	0 25 38	0 27 49
7	0 10 50	0 11 5	0 11 25	0 11 57	0 12 35	0 13 23	0 14 19	0 15 26	0 16 42	0 18 2	0 19 34	0 21 16	0 23 5	0 25 2	0 27 8
8	0 10 49	0 11 3	0 11 22	0 11 53	0 12 30	0 13 16	0 14 10	0 15 14	0 16 27	0 17 44	0 19 13	0 20 51	0 22 36	0 24 28	0 26 30
9	0 10 48	0 11 1	0 11 20	0 11 49	0 12 25	0 13 9	0 14 2	0 15 3	0 16 13	0 17 28	0 18 53	0 20 27	0 22 9	0 23 57	0 25 54
10	0 10 47	0 10 59	0 11 18	0 11 45	0 12 20	0 13 3	0 13 55	0 14 53	0 16 0	0 17 13	0 18 35	0 20 5	0 21 44	0 23 27	0 25 20
11	0 10 46	0 10 57	0 11 16	0 11 41	0 12 16	0 12 57	0 13 48	0 14 44	0 15 48	0 16 59	0 18 19	0 19 45	0 21 21	0 22 59	0 24 49
12	0 10 45	0 10 55	0 11 14	0 11 37	0 12 12	0 12 51	0 13 41	0 14 35	0 15 37	0 16 45	0 18 4	0 19 26	0 20 59	0 22 33	0 24 20
13	0 10 44	0 10 53	0 11 12	0 11 33	0 12 8	0 12 45	0 13 34	0 14 26	0 15 27	0 16 32	0 17 50	0 19 8	0 20 38	0 22 9	0 23 53
14	0 10 43	0 10 51	0 11 10	0 11 30	0 12 4	0 12 40	0 13 27	0 14 18	0 15 17	0 16 19	0 17 36	0 18 51	0 20 18	0 21 46	0 23 27
15	0 10 41	0 10 49	0 11 8	0 11 27	0 12 0	0 12 35	0 13 20	0 14 10	0 15 7	0 16 7	0 17 22	0 18 34	0 19 58	0 21 24	0 23 2
16	0 10 39	0 10 47	0 11 6	0 11 24	0 11 56	0 12 30	0 13 13	0 14 2	0 14 57	0 15 55	0 17 9	0 18 18	0 19 39	0 21 3	0 22 38
17	0 10 37	0 10 45	0 11 3	0 11 21	0 11 52	0 12 25	0 13 6	0 13 54	0 14 47	0 15 44	0 16 56	0 18 2	0 19 21	0 20 43	0 22 15
18	0 10 35	0 10 43	0 11 0	0 11 18	0 11 48	0 12 20	0 12 59	0 13 46	0 14 37	0 15 33	0 16 43	0 17 47	0 19 3	0 20 23	0 21 52
19	0 10 33	0 10 41	0 10 57	0 11 15	0 11 44	0 12 15	0 12 53	0 13 38	0 14 27	0 15 22	0 16 30	0 17 32	0 18 46	0 20 4	0 21 30
20	0 10 31	0 10 39	0 10 54	0 11 12	0 11 40	0 12 10	0 12 47	0 13 30	0 14 18	0 15 12	0 16 17	0 17 17	0 18 29	0 19 45	0 21 8
21	0 10 29	0 10 37	0 10 52	0 11 9	0 11 36	0 12 5	0 12 41	0 13 23	0 14 10	0 15 2	0 16 4	0 17 3	0 18 13	0 19 27	0 20 47
22	0 10 27	0 10 35	0 10 49	0 11 6	0 11 32	0 12 0	0 12 35	0 13 16	0 14 2	0 14 53	0 15 51	0 16 50	0 17 58	0 19 10	0 20 27
23	0 10 24	0 10 32	0 10 46	0 11 3	0 11 27	0 11 56	0 12 30	0 13 9	0 13 54	0 14 44	0 15 38	0 16 38	0 17 44	0 18 54	0 20 9

LATITUDE 18° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 36 24	0 39 40	0 43 6	0 46 41	0 50 30	0 54 29	0 58 38	1 2 59	1 7 29	1 12 10	1 17 0	1 22 1	1 27 12	1 32 33	1 38 4
1	0 37 47	0 41 15	0 44 53	0 48 39	0 52 40	0 56 53	1 1 16	1 5 49	1 10 33	1 15 30	1 20 34	1 25 51	1 31 19	1 36 57	1 42 45
2	0 39 22	0 43 2	0 46 49	0 50 51	0 55 5	0 59 33	1 4 10	1 8 57	1 13 55	1 19 9	1 24 29	1 30 3	1 35 48	1 41 43	1 47 48
3	0 41 11	0 45 3	0 49 3	0 53 19	0 57 47	1 2 31	1 7 23	1 12 24	1 17 38	1 23 9	1 28 47	1 34 38	1 40 40	1 46 53	1 53 16
4	0 43 14	0 47 19	0 51 35	0 56 6	1 0 51	1 5 51	1 11 0	1 16 19	1 21 57	1 27 41	1 33 40	1 39 48	1 46 10	1 52 43	1 59 27
5	0 45 32	0 49 52	0 54 30	0 59 15	1 4 20	1 9 38	1 15 5	1 20 46	1 26 52	1 32 50	1 39 14	1 45 42	1 52 29	1 59 24	2 6 32
6	0 48 10	0 52 51	0 57 48	1 2 52	1 8 19	1 13 58	1 19 49	1 25 52	1 32 22	1 38 44	1 45 31	1 52 26	1 59 36	2 6 54	2 14 27
7	0 51 11	0 56 18	1 1 32	1 7 2	1 12 53	1 18 58	1 25 15	1 31 43	1 38 29	1 45 26	1 52 41	2 0 6	2 7 43	2 15 27	2 23 30
8	0 54 54	1 0 22	1 6 5	1 11 59	1 17 57	1 24 50	1 31 34	1 38 35	1 45 48	1 53 22	2 0 57	2 8 55	2 16 57	2 25 19	2 33 50
9	0 59 14	1 5 11	1 11 27	1 17 51	1 24 40	1 31 43	1 39 6	1 46 37	1 54 26	2 2 27	2 10 44	2 19 9	2 27 49	2 36 44	2 45 46
10	1 4 31	1 11 6	1 17 46	1 24 55	1 32 18	1 40 3	1 47 55	1 56 10	2 4 33	2 13 17	2 22 4	2 31 13	2 40 29	2 50 2	2 59 41
11	1 11 4	1 18 14	1 25 46	1 33 32	1 41 39	1 50 1	1 58 45	2 7 38	2 16 42	2 26 4	2 35 43	2 45 30	2 55 30	3 5 41	3 16 0
12	1 19 14	1 27 20	1 35 36	1 44 18	1 53 6	2 2 30	2 11 47	2 21 36	2 31 31	2 41 44	2 52 2	3 2 40	3 13 18	3 24 14	3 35 13
13	1 29 52	1 38 50	1 48 15	1 57 46	2 7 42	2 17 48	2 28 16	2 38 49	2 49 40	3 0 46	3 11 51	3 23 17	3 34 45	3 46 26	3 58 17
14	1 43 58	1 54 20	2 4 41	2 15 22	2 26 16	2 37 34	2 48 51	3 0 30	3 12 14	3 24 5	3 36 16	3 48 25	4 0 42	4 13 11	4 25 43
15	2 4 19	2 14 42	2 26 32	2 38 21	2 50 30	3 2 52	3 15 2	3 27 45	3 40 25	3 53 12	4 6 11	4 19 0	4 32 12	4 45 20	4 58 38
16	2 30 0	2 43 4	2 55 54	3 8 57	3 22 3	3 35 26	3 48 49	4 2 17	4 15 43	4 29 16	4 43 0	4 56 39	5 10 22	5 24 1	5 37 51
17	3 7 51	3 21 41	3 35 39	3 49 36	4 3 36	4 17 34	4 31 41	4 45 41	4 59 44	5 13 46	5 27 59	5 42 1	5 56 11	6 10 23	6 24 30
18	Not calculable.														
19	3 6 38	3 20 30	3 34 5	3 48 0	4 1 52	4 15 49	4 29 54	4 43 45	4 57 49	5 11 46	5 25 54	5 39 54	5 53 58	6 7 59	6 22 4
20	2 27 49	2 40 29	2 53 15	3 6 9	3 19 3	3 32 17	3 45 35	3 58 44	4 11 58	4 25 26	4 38 58	4 52 32	5 6 1	5 18 32	5 33 13
21	2 0 14	2 11 27	2 22 47	2 34 32	2 46 23	2 58 23	3 10 41	3 22 45	3 35 13	3 47 45	4 0 27	4 13 12	4 25 56	4 38 51	4 51 56
22	1 40 26	1 50 15	2 0 26	2 10 47	2 21 22	2 32 11	2 43 20	2 54 34	3 5 51	3 17 24	3 29 4	3 40 58	3 52 55	4 4 59	4 17 18
23	1 25 54	1 34 31	1 43 31	1 52 42	2 2 9	2 11 45	2 21 48	2 31 57	2 42 24	2 52 55	3 3 46	3 14 40	3 25 42	3 36 55	3 48 20

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 36 24	0 39 40	0 43 6	0 46 41	0 50 30	0 54 29	0 58 38	1 2 59	1 7 29	1 12 10	1 17 0	1 22 1	1 27 12	1 32 33	1 38 4
1	0 35 8	0 38 15	0 41 28	0 44 55	0 48 31	0 52 20	0 56 19	1 0 26	1 4 44	1 9 12	1 13 49	1 18 36	1 23 33	1 28 40	1 33 57
2	0 33 58	0 36 56	0 40 1	0 43 19	0 46 44	0 50 23	0 54 10	0 58 6	1 2 12	1 6 29	1 10 54	1 15 27	1 20 11	1 25 5	1 30 9
3	0 32 54	0 35 43	0 38 41	0 41 50	0 45 7	0 48 36	0 52 11	0 55 58	0 59 53	1 3 59	1 8 13	1 12 35	1 17 6	1 21 48	1 26 39
4	0 31 54	0 34 36	0 37 27	0 40 27	0 43 37	0 46 57	0 50 22	0 54 0	0 57 45	1 1 41	1 5 45	1 9 56	1 14 17	1 18 47	1 23 26
5	0 30 59	0 33 34	0 36 19	0 39 10	0 42 13	0 45 25	0 48 42	0 52 12	0 55 47	0 59 34	1 3 29	1 7 30	1 11 41	1 16 1	1 20 29
6	0 30 9	0 32 38	0 35 16	0 38 0	0 40 55	0 44 0	0 47 10	0 50 31	0 53 58	0 57 36	1 1 23	1 5 15	1 9 16	1 13 27	1 17 46
7	0 29 22	0 31 46	0 34 17	0 36 57	0 39 43	0 42 40	0 45 45	0 48 57	0 52 18	0 55 47	0 59 25	1 3 9	1 7 2	1 11 3	1 15 15
8	0 28 38	0 30 57	0 33 23	0 35 57	0 38 36	0 41 27	0 44 25	0 47 31	0 50 44	0 54 5	0 57 35	1 1 11	1 4 55	1 8 48	1 12 50
9	0 27 57	0 30 11	0 32 32	0 35 0	0 37 34	0 40 20	0 43 11	0 46 11	0 49 16	0 52 31	0 55 53	0 59 21	1 2 57	1 6 43	1 10 35
10	0 27 19	0 29 29	0 31 44	0 34 7	0 36 36	0 39 17	0 42 1	0 44 55	0 47 54	0 51 3	0 54 17	0 57 39	1 1 7	1 4 46	1 8 28
11	0 26 44	0 28 49	0 30 58	0 33 17	0 35 42	0 38 17	0 40 55	0 43 44	0 46 38	0 49 41	0 52 48	0 56 4	0 59 26	1 2 58	1 6 34
12	0 26 12	0 28 12	0 30 15	0 32 31	0 34 51	0 37 20	0 39 54	0 42 38	0 45 27	0 48 24	0 51 24	0 54 34	0 57 50	1 1 15	1 4 45
13	0 25 42	0 27 38	0 29 35	0 31 47	0 34 3	0 36 27	0 38 57	0 41 36	0 44 20	0 47 11	0 50 5	0 53 9	0 56 19	0 59 37	1 3 1
14	0 25 13	0 27 5	0 28 57	0 31 5	0 33 17	0 35 37	0 38 3	0 40 37	0 43 16	0 46 1	0 48 49	0 51 48	0 54 52	0 58 4	1 1 22
15	0 24 45	0 26 33	0 28 21	0 30 25	0 32 33	0 34 49	0 37 11	0 39 40	0 42 15	0 44 54	0 47 36	0 50 31	0 53 29	0 56 35	0 59 47
16	0 24 18	0 26 2	0 27 47	0 29 47	0 31 51	0 34 3	0 36 21	0 38 45	0 41 16	0 43 49	0 46 27	0 49 17	0 52 10	0 55 10	0 58 16
17	0 23 52	0 25 32	0 27 15	0 29 11	0 31 11	0 33 19	0 35 33	0 37 52	0 40 19	0 42 47	0 45 21	0 48 6	0 50 54	0 53 49	0 56 49
18	0 23 26	0 25 3	0 26 45	0 28 37	0 30 33	0 32 37	0 34 47	0 37 1	0 39 24	0 41 48	0 44 18	0 46 58	0 49 41	0 52 31	0 55 26
19	0 23 1	0 24 35	0 26 16	0 28 5	0 29 57	0 31 57	0 34 3	0 36 13	0 38 31	0 40 51	0 43 18	0 45 53	0 48 31	0 51 16	0 54 6
20	0 22 36	0 24 8	0 25 48	0 27 33	0 29 23	0 31 19	0 33 21	0 35 27	0 37 40	0 39 57	0 42 21	0 44 51	0 47 24	0 50 4	0 52 49
21	0 22 13	0 23 42	0 25 21	0 27 3	0 28 50	0 30 43	0 32 41	0 34 43	0 36 52	0 39 6	0 41 26	0 43 52	0 46 20	0 48 56	0 51 37
22	0 21 51	0 23 18	0 24 55	0 26 34	0 28 18	0 30 8	0 32 3	0 34 1	0 36 7	0 38 18	0 40 34	0 42 55	0 45 19	0 47 51	0 50 28
23	0 21 31	0 22 56	0 24 29	0 26 5	0 27 46	0 29 33	0 31 25	0 33 21	0 35 24	0 37 31	0 39 43	0 42 0	0 44 21	0 46 49	0 49 21

LATITUDE 18° NORTH OR SOUTH.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 43 45	1 49 34	1 55 34	2 1 42	2 7 58	2 14 24	2 20 58	2 27 41	2 34 35	2 41 35	2 48 42	2 55 58	3 3 22	3 10 54	3 18 34
1	1 39 19	1 44 51	1 50 35	1 56 29	2 2 28	2 8 38	2 14 54	2 21 21	2 27 56	2 34 39	2 41 30	2 48 30	2 55 37	3 2 53	3 10 8
2	1 35 16	1 40 34	1 46 3	1 51 41	1 57 27	2 3 22	2 9 24	2 15 35	2 21 55	2 28 22	2 34 58	2 41 43	2 48 33	2 55 29	3 2 36
3	1 31 35	1 36 40	1 41 56	1 47 21	1 52 54	1 58 35	2 4 22	2 10 20	2 16 25	2 22 38	2 28 59	2 35 29	2 42 4	2 48 46	2 55 37
4	1 28 11	1 33 5	1 38 9	1 43 22	1 48 43	1 54 11	1 59 45	2 5 31	2 11 21	2 17 20	2 23 27	2 29 42	2 36 3	2 42 31	2 49 7
5	1 25 4	1 29 47	1 34 40	1 39 42	1 44 51	1 50 6	1 55 31	2 1 2	2 6 39	2 12 25	2 18 19	2 24 20	2 30 27	2 36 42	2 43 5
6	1 22 11	1 26 43	1 31 24	1 36 14	1 41 11	1 46 15	1 51 30	1 56 49	2 2 15	2 7 48	2 13 29	2 19 18	2 25 13	2 31 16	2 37 26
7	1 19 29	1 23 50	1 28 21	1 33 1	1 37 47	1 42 41	1 47 43	1 52 52	1 58 8	2 3 30	2 8 59	2 14 35	2 20 19	2 26 10	2 32 7
8	1 16 56	1 21 9	1 25 31	1 30 0	1 34 37	1 39 21	1 44 12	1 49 10	1 54 16	1 59 28	2 4 47	2 10 10	2 15 43	2 21 23	2 27 9
9	1 14 33	1 18 38	1 22 51	1 27 11	1 31 39	1 36 13	1 40 55	1 45 43	1 50 39	1 55 41	2 0 50	2 6 3	2 11 25	2 16 53	2 22 28
10	1 12 19	1 16 16	1 20 21	1 24 33	1 28 52	1 33 17	1 37 50	1 42 29	1 47 15	1 52 7	1 57 6	2 2 11	2 7 22	2 12 39	2 18 4
11	1 10 19	1 14 8	1 18 5	1 22 6	1 26 15	1 30 31	1 34 54	1 39 25	1 44 2	1 48 45	1 53 35	1 58 31	2 3 32	2 8 40	2 13 57
12	1 8 23	1 12 5	1 15 55	1 19 45	1 23 46	1 27 54	1 32 8	1 36 31	1 41 0	1 45 35	1 50 16	1 55 3	1 59 55	2 4 54	2 10 2
13	1 6 31	1 10 6	1 13 49	1 17 32	1 21 25	1 25 26	1 29 32	1 33 47	1 38 8	1 42 35	1 47 8	1 51 47	1 56 30	2 1 20	2 6 18
14	1 4 43	1 8 11	1 11 47	1 15 26	1 19 12	1 23 6	1 27 5	1 31 12	1 35 25	1 39 44	1 44 9	1 48 40	1 53 15	1 57 57	2 2 45
15	1 2 59	1 6 20	1 9 48	1 13 24	1 17 5	1 20 53	1 24 46	1 28 45	1 32 50	1 37 1	1 41 18	1 45 42	1 50 9	1 54 43	1 59 23
16	1 1 20	1 4 36	1 8 0	1 11 30	1 15 3	1 18 44	1 22 31	1 26 24	1 30 22	1 34 26	1 38 36	1 42 53	1 47 12	1 51 39	1 56 11
17	0 59 48	1 3 0	1 6 17	1 9 41	1 13 8	1 16 42	1 20 23	1 24 10	1 28 1	1 31 58	1 36 1	1 40 11	1 44 23	1 48 43	1 53 7
18	0 58 21	1 1 28	1 4 39	1 7 57	1 11 19	1 14 47	1 18 21	1 22 2	1 25 47	1 29 37	1 33 33	1 37 36	1 41 42	1 45 55	1 50 11
19	0 56 58	1 0 0	1 3 6	1 6 18	1 9 35	1 12 57	1 16 25	1 20 0	1 23 39	1 27 23	1 31 12	1 35 10	1 39 8	1 43 14	1 47 23
20	0 55 39	0 58 35	1 1 37	1 4 44	1 7 56	1 11 12	1 14 34	1 18 3	1 21 36	1 25 14	1 28 57	1 32 46	1 36 40	1 40 39	1 44 42
21	0 54 23	0 57 14	1 0 11	1 3 13	1 6 20	1 9 31	1 12 48	1 16 11	1 19 38	1 23 10	1 26 47	1 30 30	1 34 18	1 38 10	1 42 7
22	0 53 10	0 55 56	0 58 48	1 1 45	1 4 47	1 7 54	1 11 6	1 14 23	1 17 44	1 21 11	1 24 42	1 28 19	1 32 1	1 35 47	1 39 38
23	0 51 59	0 54 41	0 57 28	1 0 20	1 3 17	1 6 19	1 9 26	1 12 37	1 15 53	1 19 15	1 22 41	1 26 12	1 29 48	1 33 29	1 37 14

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	3 26 22	3 34 15	3 42 18	3 50 26	3 58 41	4 7 4	4 15 33	4 24 9	4 32 50	4 41 38	4 50 33	4 59 34	5 8 39	5 17 53	5 27 10
1	3 17 38	3 25 14	3 32 58	3 40 48	3 48 46	3 56 51	4 5 4	4 13 22	4 21 44	4 30 13	4 38 49	4 47 32	4 56 18	5 5 12	5 14 11
2	3 9 49	3 17 8	3 24 34	3 32 6	3 39 47	3 47 35	3 55 32	4 3 33	4 11 38	4 19 50	4 28 9	4 36 34	4 45 3	4 53 38	5 2 20
3	3 2 35	3 9 39	3 16 50	3 24 7	3 31 32	3 39 4	3 46 45	3 54 30	4 2 19	4 10 15	4 18 18	4 26 27	4 34 41	4 43 0	4 51 25
4	2 55 51	3 2 41	3 9 38	3 16 40	3 23 50	3 31 7	3 38 33	3 46 3	3 53 37	4 1 18	4 9 6	4 17 0	4 25 0	4 33 4	4 41 13
5	2 49 36	2 56 12	3 2 55	3 9 43	3 16 38	3 23 41	3 30 52	3 38 7	3 45 28	3 52 55	4 0 29	4 8 9	4 15 55	4 23 44	4 31 37
6	2 43 44	2 50 7	2 56 36	3 3 11	3 9 53	3 16 42	3 23 38	3 30 39	3 37 46	3 45 0	3 52 22	3 59 48	4 7 20	4 14 56	4 22 36
7	2 38 12	2 44 23	2 50 40	2 57 3	3 3 33	3 10 8	3 16 50	3 23 37	3 30 30	3 37 33	3 44 43	3 51 57	3 59 15	4 6 38	4 14 6
8	2 33 2	2 39 1	2 45 6	2 51 17	2 57 34	3 3 57	3 10 26	3 17 1	3 23 42	3 30 32	3 37 28	3 44 29	3 51 34	3 58 44	4 6 2
9	2 28 10	2 33 58	2 39 52	2 45 51	2 51 57	2 58 9	3 4 27	3 10 50	3 17 19	3 23 56	3 30 39	3 37 26	3 44 19	3 51 17	3 58 23
10	2 23 36	2 29 13	2 34 56	2 40 44	2 46 39	2 52 40	2 58 48	3 5 0	3 11 18	3 17 42	3 24 12	3 30 47	3 37 29	3 44 16	3 51 8
11	2 19 19	2 24 46	2 30 19	2 35 56	2 41 41	2 47 30	2 53 26	2 59 29	3 5 36	3 11 49	3 18 6	3 24 30	3 31 2	3 37 39	3 44 18
12	2 15 15	2 20 33	2 25 56	2 31 22	2 36 57	2 42 36	2 48 21	2 54 15	3 0 12	3 6 14	3 12 20	3 18 34	3 24 56	3 31 21	3 37 49
13	2 11 22	2 16 31	2 21 45	2 27 2	2 32 27	2 37 57	2 43 31	2 49 16	2 55 3	3 0 55	3 6 51	3 12 55	3 19 7	3 25 21	3 31 38
14	2 7 40	2 12 40	2 17 45	2 22 54	2 28 10	2 33 31	2 38 54	2 44 31	2 50 9	2 55 51	3 1 37	3 7 31	3 13 33	3 19 38	3 25 45
15	2 4 9	2 9 0	2 13 56	2 18 57	2 24 4	2 29 17	2 34 35	2 39 59	2 45 28	2 51 0	2 56 37	3 2 22	3 8 14	3 14 10	3 20 9
16	2 0 49	2 5 32	2 10 19	2 15 12	2 20 10	2 25 15	2 30 24	2 35 39	2 40 59	2 46 22	2 51 50	2 57 27	3 3 10	3 8 57	3 14 47
17	1 57 37	2 2 12	2 6 52	2 11 37	2 16 27	2 21 24	2 26 24	2 31 31	2 36 43	2 41 58	2 47 18	2 52 46	2 58 20	3 3 58	3 9 39
18	1 54 33	1 59 1	2 3 34	2 8 12	2 12 55	2 17 44	2 22 36	2 27 34	2 32 38	2 37 45	2 42 57	2 48 16	2 53 42	2 59 12	3 4 44
19	1 51 38	1 55 59	2 0 25	2 4 56	2 9 32	2 14 13	2 18 58	2 23 48	2 28 44	2 33 43	2 38 47	2 43 58	2 49 16	2 54 37	3 0 0
20	1 48 50	1 53 4	1 57 24	2 1 48	2 6 17	2 10 50	2 15 28	2 20 11	2 24 59	2 29 51	2 34 47	2 39 50	2 45 0	2 50 12	2 55 26
21	1 46 9	1 50 16	1 54 29	1 58 46	2 3 8	2 7 35	2 12 6	2 16 42	2 21 23	2 26 8	2 30 57	2 35 52	2 40 53	2 45 56	2 51 3
22	1 43 34	1 47 35	1 51 41	1 55 51	2 0 6	2 4 27	2 8 51	2 13 20	2 17 54	2 22 32	2 27 14	2 32 1	2 36 54	2 41 49	2 46 49
23	1 41 4	1 44 59	1 48 59	1 53 3	1 57 12	2 1 25	2 5 43	2 10 5	2 14 32	2 19 3	2 23 38	2 28 18	2 33 2	2 37 51	2 42 45

LATITUDE 19° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 11 0	0 11 18	0 11 45	0 12 26	0 13 17	0 14 19	0 15 34	0 16 59	0 18 36	0 20 24	0 22 21	0 24 32	0 26 52	0 29 23	0 32 7
1	0 11 1	0 11 19	0 11 51	0 12 32	0 13 27	0 14 32	0 15 48	0 17 18	0 19 0	0 20 55	0 23 0	0 25 18	0 27 44	0 30 22	0 33 14
2	0 11 3	0 11 20	0 11 57	0 12 39	0 13 38	0 14 45	0 16 5	0 17 40	0 19 27	0 21 29	0 23 42	0 26 7	0 28 40	0 31 28	0 34 29
3	0 11 5	0 11 22	0 12 3	0 12 46	0 13 49	0 14 59	0 16 24	0 18 4	0 19 56	0 22 6	0 24 28	0 27 0	0 29 40	0 32 40	0 35 51
4	0 11 7	0 11 26	0 12 5	0 12 54	0 14 0	0 15 15	0 16 49	0 18 33	0 20 33	0 22 49	0 25 19	0 28 0	0 30 52	0 34 2	0 37 24
5	0 11 9	0 11 31	0 12 8	0 13 2	0 14 12	0 15 33	0 17 14	0 19 5	0 21 15	0 23 37	0 26 16	0 29 9	0 32 16	0 35 37	0 39 11
6	0 11 10	0 11 34	0 12 14	0 13 12	0 14 26	0 15 53	0 17 42	0 19 41	0 22 1	0 24 33	0 27 23	0 30 29	0 33 51	0 37 25	0 41 13
7	0 11 12	0 11 37	0 12 20	0 13 22	0 14 42	0 16 15	0 18 13	0 20 22	0 22 52	0 25 37	0 28 40	0 32 0	0 35 37	0 39 26	0 43 31
8	0 11 14	0 11 41	0 12 27	0 13 33	0 15 0	0 16 41	0 18 48	0 21 10	0 23 52	0 26 52	0 30 8	0 33 42	0 37 35	0 41 42	0 46 7
9	0 11 16	0 11 45	0 12 36	0 13 50	0 15 23	0 17 17	0 19 34	0 22 10	0 25 8	0 28 24	0 32 1	0 35 57	0 40 11	0 44 43	0 49 33
10	0 11 18	0 11 50	0 12 48	0 14 10	0 15 53	0 18 6	0 20 33	0 23 24	0 26 38	0 30 11	0 34 10	0 38 28	0 43 4	0 48 2	0 53 18
11	0 11 21	0 11 55	0 12 58	0 14 27	0 16 31	0 18 43	0 21 30	0 24 46	0 28 18	0 32 22	0 36 45	0 41 33	0 46 33	0 52 5	0 57 54
12	0 11 24	0 12 6	0 13 21	0 14 56	0 17 17	0 19 55	0 23 8	0 26 40	0 30 49	0 35 16	0 40 13	0 45 29	0 51 14	0 57 21	1 3 41
13	0 11 28	0 12 18	0 13 41	0 15 40	0 18 20	0 21 22	0 24 57	0 29 3	0 33 49	0 38 56	0 44 30	0 50 32	0 56 59	1 3 53	1 11 7
14	0 11 32	0 12 30	0 14 12	0 16 34	0 19 40	0 23 16	0 27 32	0 32 25	0 37 48	0 43 48	0 50 16	0 57 10	1 4 43	1 12 23	1 20 36
15	0 11 36	0 12 47	0 14 52	0 17 47	0 21 42	0 26 2	0 31 16	0 37 11	0 43 42	0 50 45	0 58 27	1 6 30	1 14 58	1 24 1	1 33 29
16	0 11 42	0 13 25	0 16 12	0 19 52	0 24 46	0 30 39	0 37 5	0 44 25	0 52 36	1 1 5	1 10 12	1 19 46	1 30 0	1 40 25	1 51 14
17	0 11 50	0 14 32	0 18 37	0 23 50	0 30 44	0 38 37	0 47 22	0 56 47	1 6 58	1 17 40	1 28 45	1 40 15	1 52 6	2 4 15	2 16 35
18	0 12 45	0 17 38	0 24 38	0 33 45	0 44 14	0 55 29	1 7 29	1 19 43	1 32 33	1 45 38	1 58 43	2 11 57	2 25 44	2 39 7	2 52 48
19	Not calculable.														
20	0 12 45	0 17 29	0 24 38	0 33 38	0 44 1	0 56 14	1 7 1	1 19 14	1 31 48	1 44 45	1 57 51	2 11 11	2 24 41	2 38 3	2 51 38
21	0 11 47	0 14 27	0 18 27	0 23 44	0 30 22	0 37 54	0 46 32	0 55 47	1 6 3	1 16 23	1 27 13	1 38 34	1 50 13	2 2 9	2 14 15
22	0 11 39	0 13 18	0 15 55	0 19 42	0 24 22	0 29 52	0 36 14	0 43 18	0 51 44	0 59 33	1 8 25	1 17 43	1 27 41	1 37 48	1 48 22
23	0 11 38	0 12 45	0 14 43	0 17 33	0 21 16	0 25 30	0 30 24	0 35 55	0 42 27	0 49 4	0 56 24	1 4 9	1 12 29	1 21 0	1 30 1

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 11 0	0 11 18	0 11 45	0 12 26	0 13 17	0 14 19	0 15 34	0 16 59	0 18 36	0 20 24	0 22 21	0 24 32	0 26 52	0 29 23	0 32 7
1	0 10 58	0 11 15	0 11 41	0 12 21	0 13 10	0 14 8	0 15 20	0 16 40	0 18 14	0 19 57	0 21 48	0 23 51	0 26 5	0 28 29	0 31 6
2	0 10 57	0 11 13	0 11 38	0 12 16	0 13 3	0 13 58	0 15 7	0 16 23	0 17 53	0 19 31	0 21 18	0 23 14	0 25 22	0 27 40	0 30 10
3	0 10 56	0 11 11	0 11 35	0 12 11	0 12 56	0 13 48	0 14 54	0 16 7	0 17 33	0 19 7	0 20 50	0 22 40	0 24 43	0 26 55	0 29 18
4	0 10 55	0 11 9	0 11 32	0 12 6	0 12 49	0 13 39	0 14 42	0 15 52	0 17 14	0 18 44	0 20 23	0 22 9	0 24 7	0 26 14	0 28 30
5	0 10 54	0 11 7	0 11 29	0 12 1	0 12 42	0 13 31	0 14 31	0 15 38	0 16 56	0 18 22	0 19 57	0 21 40	0 23 33	0 25 36	0 27 45
6	0 10 52	0 11 5	0 11 26	0 11 56	0 12 36	0 13 24	0 14 21	0 15 25	0 16 39	0 18 2	0 19 33	0 21 13	0 23 2	0 25 0	0 27 4
7	0 10 50	0 11 3	0 11 23	0 11 52	0 12 30	0 13 17	0 14 12	0 15 13	0 16 24	0 17 43	0 19 11	0 20 48	0 22 33	0 24 27	0 26 26
8	0 10 48	0 11 1	0 11 20	0 11 48	0 12 25	0 13 10	0 14 3	0 15 2	0 16 10	0 17 26	0 18 51	0 20 25	0 22 6	0 23 56	0 25 51
9	0 10 47	0 10 59	0 11 17	0 11 44	0 12 20	0 13 4	0 13 54	0 14 52	0 15 57	0 17 11	0 18 33	0 20 4	0 21 41	0 23 27	0 25 18
10	0 10 46	0 10 57	0 11 15	0 11 40	0 12 15	0 12 58	0 13 46	0 14 42	0 15 45	0 16 57	0 18 16	0 19 44	0 21 17	0 22 59	0 24 47
11	0 10 44	0 10 55	0 11 13	0 11 37	0 12 11	0 12 52	0 13 39	0 14 33	0 15 34	0 16 44	0 17 59	0 19 24	0 20 54	0 22 33	0 24 18
12	0 10 42	0 10 53	0 11 11	0 11 34	0 12 7	0 12 46	0 13 32	0 14 24	0 15 23	0 16 31	0 17 43	0 19 5	0 20 32	0 22 8	0 23 50
13	0 10 40	0 10 51	0 11 9	0 11 31	0 12 3	0 12 41	0 13 25	0 14 16	0 15 13	0 16 19	0 17 28	0 18 47	0 20 11	0 21 44	0 23 23
14	0 10 38	0 10 49	0 11 7	0 11 28	0 11 59	0 12 36	0 13 18	0 14 8	0 15 3	0 16 7	0 17 13	0 18 30	0 19 52	0 21 22	0 22 58
15	0 10 36	0 10 47	0 11 5	0 11 25	0 11 55	0 12 31	0 13 12	0 14 0	0 14 53	0 15 55	0 16 59	0 18 14	0 19 34	0 21 1	0 22 34
16	0 10 34	0 10 45	0 11 3	0 11 22	0 11 51	0 12 26	0 13 6	0 13 52	0 14 44	0 15 44	0 16 46	0 17 59	0 19 17	0 20 41	0 22 11
17	0 10 32	0 10 43	0 11 0	0 11 19	0 11 47	0 12 21	0 13 0	0 13 44	0 14 35	0 15 33	0 16 34	0 17 44	0 19 0	0 20 22	0 21 49
18	0 10 31	0 10 41	0 10 57	0 11 16	0 11 43	0 12 16	0 12 54	0 13 36	0 14 26	0 15 22	0 16 22	0 17 30	0 18 44	0 20 4	0 21 28
19	0 10 30	0 10 39	0 10 54	0 11 13	0 11 39	0 12 11	0 12 48	0 13 29	0 14 18	0 15 12	0 16 11	0 17 17	0 18 39	0 19 46	0 21 8
20	0 10 29	0 10 37	0 10 51	0 11 10	0 11 36	0 12 6	0 12 42	0 13 22	0 14 10	0 15 2	0 16 0	0 17 4	0 18 14	0 19 29	0 20 48
21	0 10 28	0 10 35	0 10 48	0 11 7	0 11 33	0 12 1	0 12 36	0 13 15	0 14 3	0 14 53	0 15 50	0 16 52	0 18 0	0 19 12	0 20 29
22	0 10 26	0 10 33	0 10 45	0 11 4	0 11 29	0 11 56	0 12 31	0 13 9	0 13 56	0 14 45	0 15 40	0 16 40	0 17 46	0 18 56	0 20 11
23	0 10 24	0 10 31	0 10 41	0 11 1	0 11 25	0 11 52	0 12 26	0 13 3	0 13 49	0 14 37	0 15 30	0 16 28	0 17 33	0 18 41	0 19 54

LATITUDE 19° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 34 59	0 38 4	0 41 19	0 44 44	0 48 19	0 52 6	0 56 2	1 0 8	1 4 25	1 8 51	1 13 27	1 18 13	1 23 8	1 28 13	1 33 27
1	0 36 16	0 39 31	0 42 55	0 46 35	0 50 17	0 54 13	0 58 19	1 2 37	1 7 7	1 11 47	1 16 36	1 21 36	1 26 45	1 32 5	1 37 33
2	0 37 41	0 41 6	0 44 41	0 48 37	0 52 27	0 56 34	1 0 53	1 5 24	1 10 8	1 15 3	1 20 5	1 25 20	1 30 46	1 36 22	1 42 4
3	0 39 15	0 42 51	0 46 39	0 50 51	0 54 49	0 59 11	1 3 45	1 8 31	1 13 29	1 18 41	1 23 57	1 29 27	1 35 12	1 41 5	1 47 3
4	0 41 0	0 44 49	0 48 49	0 53 11	0 57 29	1 2 8	1 6 57	1 11 58	1 17 14	1 22 43	1 28 16	1 34 4	1 40 6	1 46 17	1 52 36
5	0 42 58	0 47 3	0 51 19	0 55 49	1 0 30	1 5 29	1 10 34	1 15 52	1 21 25	1 27 13	1 33 6	1 39 14	1 45 33	1 52 3	1 58 45
6	0 45 16	0 49 36	0 54 10	0 58 57	1 3 58	1 9 16	1 14 41	1 20 20	1 26 12	1 32 21	1 38 38	1 45 7	1 51 49	1 58 44	2 5 48
7	0 47 54	0 52 31	0 57 26	1 2 32	1 7 55	1 13 33	1 19 20	1 25 24	1 31 37	1 38 10	1 44 52	1 51 45	1 58 52	2 6 13	2 13 42
8	0 50 55	0 55 52	1 1 10	1 6 37	1 12 24	1 18 24	1 24 36	1 31 8	1 37 45	1 44 44	1 51 53	1 59 12	2 6 45	2 14 34	2 22 30
9	0 54 43	1 0 7	1 5 53	1 11 48	1 18 1	1 24 35	1 31 16	1 38 17	1 45 27	1 52 58	2 0 36	2 8 28	2 16 31	2 24 49	2 33 18
10	0 58 51	1 4 43	1 10 57	1 17 21	1 24 1	1 31 9	1 38 20	1 45 51	1 53 35	2 1 38	2 9 45	2 18 10	2 26 43	2 35 31	2 44 33
11	1 4 0	1 10 29	1 17 13	1 24 12	1 31 32	1 39 13	1 47 0	1 55 13	2 3 31	2 12 9	2 20 57	2 30 7	2 39 12	2 48 44	2 58 16
12	1 10 32	1 17 38	1 25 8	1 32 49	1 40 50	1 49 16	1 57 46	2 6 40	2 15 40	2 25 0	2 34 32	2 44 13	2 54 9	3 4 14	3 14 33
13	1 18 36	1 26 39	1 34 50	1 43 27	1 52 18	2 1 28	2 10 54	2 20 28	2 30 20	2 40 26	2 50 44	3 1 12	3 10 47	3 22 40	3 33 43
14	1 29 10	1 38 4	1 47 25	1 56 55	2 6 41	2 16 48	2 27 1	2 37 37	2 48 10	2 59 18	3 10 29	3 21 43	3 33 5	3 44 45	3 56 36
15	1 43 11	1 53 24	2 3 41	2 14 12	2 25 11	2 36 18	2 47 37	2 59 9	3 10 46	3 22 32	3 34 38	3 46 43	3 58 53	4 11 17	4 23 46
16	2 2 19	2 13 41	2 25 18	2 37 6	2 49 12	3 1 23	3 13 43	3 26 13	3 38 44	3 51 25	4 4 25	4 17 15	4 30 12	4 43 18	4 56 33
17	2 28 57	2 41 45	2 54 42	3 7 15	3 20 37	3 33 49	3 47 15	4 0 33	4 13 51	4 27 26	4 41 1	4 54 37	5 8 12	5 21 49	5 35 42
18	3 6 38	3 20 30	3 34 5	3 48 0	4 1 52	4 15 49	4 29 54	4 43 45	4 57 49	5 11 46	5 25 54	5 39 54	5 53 58	6 7 59	6 22 4
19	Not calculable.														
20	3 5 14	3 18 50	3 32 41	3 46 33	4 0 21	4 14 1	4 27 54	4 41 50	4 55 47	5 9 44	5 23 44	5 37 40	5 51 38	6 5 33	6 19 33
21	2 26 35	2 39 4	2 51 54	3 4 44	3 17 35	3 30 35	3 43 42	3 56 51	4 10 7	4 23 22	4 36 46	4 50 9	5 3 41	5 17 3	5 30 45
22	1 59 5	2 10 10	2 21 39	2 33 4	2 44 50	2 56 45	3 8 59	3 20 57	3 33 21	3 46 0	3 58 21	4 11 0	4 23 41	4 36 31	4 49 23
23	1 39 29	1 49 5	1 59 17	2 9 33	2 19 53	2 30 41	2 41 43	2 52 49	3 4 7	3 15 32	3 27 14	3 38 55	3 50 47	4 2 46	4 14 46

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 34 59	0 38 4	0 41 19	0 44 44	0 48 19	0 52 6	0 56 2	1 0 8	1 4 25	1 8 51	1 13 27	1 18 13	1 23 8	1 28 13	1 33 27
1	0 33 52	0 36 49	0 39 53	0 43 8	0 46 34	0 50 11	0 53 56	0 57 52	1 1 57	1 6 13	1 10 37	1 15 11	1 19 54	1 24 46	1 29 47
2	0 32 49	0 35 39	0 38 34	0 41 40	0 44 57	0 48 25	0 52 0	0 55 46	0 59 40	1 3 46	1 7 58	1 12 21	1 16 53	1 21 33	1 26 22
3	0 31 50	0 34 33	0 37 21	0 40 19	0 43 28	0 46 47	0 50 13	0 53 50	0 57 34	1 1 30	1 5 31	1 9 43	1 14 4	1 18 33	1 23 11
4	0 30 55	0 33 31	0 36 13	0 39 4	0 42 5	0 45 16	0 48 34	0 52 2	0 55 37	0 59 24	1 3 15	1 7 17	1 11 28	1 15 46	1 20 13
5	0 30 4	0 32 33	0 35 10	0 37 55	0 40 48	0 43 52	0 47 2	0 50 22	0 53 49	0 57 27	1 1 9	1 5 2	1 9 3	1 13 11	1 17 28
6	0 29 17	0 31 40	0 34 12	0 36 50	0 39 36	0 42 34	0 45 37	0 48 49	0 52 9	0 55 39	0 59 13	1 2 57	1 6 48	1 10 46	1 14 55
7	0 28 34	0 30 52	0 33 18	0 35 50	0 38 30	0 41 22	0 44 18	0 47 24	0 50 36	0 53 59	0 57 26	1 1 2	1 4 44	1 8 33	1 12 32
8	0 27 54	0 30 7	0 32 28	0 34 54	0 37 29	0 40 15	0 43 5	0 46 5	0 49 9	0 52 25	0 55 45	0 59 14	1 2 48	1 6 29	1 10 19
9	0 27 17	0 29 25	0 31 41	0 34 2	0 36 32	0 39 12	0 41 56	0 44 50	0 47 48	0 50 57	0 54 10	0 57 32	1 0 59	1 4 33	1 8 16
10	0 26 43	0 28 46	0 30 57	0 33 14	0 35 39	0 38 13	0 40 51	0 43 39	0 46 32	0 49 34	0 52 41	0 55 56	0 59 17	1 2 45	1 6 22
11	0 26 10	0 28 9	0 30 15	0 32 28	0 34 49	0 37 17	0 39 50	0 42 32	0 45 20	0 48 16	0 51 17	0 54 26	0 57 42	1 1 3	1 4 34
12	0 25 38	0 27 34	0 29 35	0 31 44	0 34 1	0 36 24	0 38 52	0 41 29	0 44 12	0 47 2	0 49 58	0 53 2	0 56 12	0 59 27	1 2 52
13	0 25 8	0 27 1	0 28 57	0 31 2	0 33 15	0 35 34	0 37 57	0 40 29	0 43 7	0 45 52	0 48 43	0 51 42	0 54 47	0 57 56	1 1 15
14	0 24 40	0 26 30	0 28 21	0 30 22	0 32 31	0 34 46	0 37 5	0 39 33	0 42 6	0 44 46	0 47 32	0 50 26	0 53 26	0 56 30	0 59 43
15	0 24 13	0 26 0	0 27 47	0 29 44	0 31 49	0 34 0	0 36 16	0 38 40	0 41 8	0 43 43	0 46 24	0 49 14	0 52 9	0 55 8	0 58 15
16	0 23 47	0 25 31	0 27 15	0 29 8	0 31 9	0 33 16	0 35 29	0 37 49	0 40 13	0 42 43	0 45 20	0 48 5	0 50 55	0 53 49	0 56 51
17	0 23 22	0 25 3	0 26 45	0 28 34	0 30 31	0 32 34	0 34 44	0 37 0	0 39 20	0 41 46	0 44 19	0 46 59	0 49 4	0 52 33	0 55 30
18	0 22 58	0 24 36	0 26 16	0 28 2	0 29 56	0 31 55	0 34 1	0 36 13	0 38 29	0 40 51	0 43 20	0 45 55	0 48 35	0 51 19	0 54 11
19	0 22 35	0 24 10	0 25 48	0 27 32	0 29 23	0 31 18	0 33 20	0 35 28	0 37 40	0 39 58	0 42 23	0 44 53	0 47 28	0 50 7	0 52 54
20	0 22 13	0 23 45	0 25 21	0 27 3	0 28 51	0 30 43	0 32 41	0 34 45	0 36 53	0 39 7	0 41 28	0 43 53	0 46 23	0 48 57	0 51 39
21	0 21 52	0 23 21	0 24 55	0 26 35	0 28 20	0 30 9	0 32 3	0 34 4	0 36 8	0 38 19	0 40 36	0 42 57	0 45 23	0 47 53	0 50 30
22	0 21 32	0 22 59	0 24 30	0 26 8	0 27 49	0 29 35	0 31 27	0 33 25	0 35 26	0 37 33	0 39 46	0 42 3	0 44 26	0 46 52	0 49 25
23	0 21 12	0 22 37	0 24 6	0 25 41	0 27 19	0 29 2	0 30 52	0 32 47	0 34 45	0 36 49	0 38 58	0 41 11	0 43 30	0 45 53	0 48 22

LATITUDE 19° NORTH OR SOUTH.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 38 52	1 44 24	1 50 6	1 55 56	2 1 55	2 8 4	2 14 20	2 20 45	2 27 18	2 34 0	2 40 49	2 47 47	2 54 50	3 2 3	3 9 23
1	1 34 56	1 40 11	1 45 40	1 51 16	1 57 0	2 2 53	2 8 55	2 15 5	2 21 22	2 27 48	2 34 22	2 41 4	2 47 52	2 54 50	3 1 55
2	1 31 18	1 36 19	1 41 35	1 46 58	1 52 29	1 58 8	2 3 41	2 9 51	2 15 53	2 22 4	2 28 23	2 34 49	2 41 22	2 48 5	2 54 55
3	1 27 56	1 32 47	1 37 51	1 43 2	1 48 51	1 54 47	1 59 36	2 5 1	2 10 51	2 16 49	2 22 55	2 29 7	2 35 25	2 41 53	2 48 30
4	1 24 48	1 29 29	1 34 22	1 39 21	1 44 58	1 50 42	1 55 19	2 0 32	2 6 10	2 11 55	2 17 48	2 23 47	2 29 52	2 36 6	2 42 36
5	1 21 59	1 26 25	1 31 7	1 35 54	1 40 50	1 45 53	1 50 55	1 56 22	2 1 48	2 7 21	2 13 1	2 18 47	2 24 40	2 30 41	2 36 52
6	1 19 17	1 23 34	1 28 4	1 32 43	1 37 29	1 42 22	1 47 15	1 52 33	1 57 48	2 3 9	2 8 35	2 14 7	2 19 49	2 25 38	2 31 36
7	1 16 46	1 20 55	1 25 13	1 29 44	1 34 20	1 39 3	1 43 45	1 48 51	1 53 56	1 59 6	2 4 24	2 9 48	2 15 19	2 20 57	2 26 43
8	1 14 27	1 18 29	1 22 34	1 26 58	1 31 25	1 35 58	1 40 31	1 45 27	1 50 22	1 55 22	2 0 30	2 5 44	2 11 5	2 16 32	2 22 6
9	1 12 16	1 16 9	1 20 5	1 24 21	1 28 40	1 33 4	1 37 28	1 42 15	1 47 1	1 51 51	1 56 50	2 1 54	2 7 5	2 12 22	2 17 45
10	1 10 12	1 13 54	1 17 46	1 21 53	1 26 4	1 30 19	1 34 34	1 39 13	1 43 50	1 48 31	1 53 21	1 58 15	2 3 17	2 8 24	2 13 39
11	1 8 14	1 11 46	1 15 36	1 19 31	1 23 35	1 27 43	1 31 50	1 36 20	1 40 49	1 45 22	1 50 4	1 54 50	1 59 44	2 4 42	2 9 48
12	1 6 23	1 9 46	1 13 34	1 17 17	1 21 14	1 25 15	1 29 14	1 33 36	1 37 57	1 42 22	1 46 56	1 51 34	1 56 20	2 1 9	2 6 7
13	1 4 38	1 7 53	1 11 38	1 15 10	1 19 0	1 22 54	1 26 46	1 31 0	1 35 14	1 39 31	1 43 57	1 48 27	1 53 5	1 57 45	2 2 35
14	1 2 59	1 6 6	1 9 47	1 13 0	1 16 48	1 20 40	1 24 25	1 28 32	1 32 39	1 36 48	1 41 6	1 45 28	1 49 58	1 54 30	1 59 12
15	1 1 25	1 4 25	1 8 1	1 11 16	1 14 53	1 18 33	1 22 11	1 26 11	1 30 11	1 34 12	1 38 23	1 42 37	1 46 59	1 51 23	1 55 57
16	0 59 56	1 2 51	1 6 19	1 9 31	1 13 2	1 16 36	1 20 8	1 24 1	1 27 55	1 31 49	1 35 54	1 40 1	1 44 16	1 48 33	1 52 53
17	0 58 31	1 1 22	1 4 41	1 7 51	1 11 16	1 14 44	1 18 10	1 21 57	1 25 45	1 29 33	1 33 32	1 37 32	1 41 41	1 45 51	1 50 3
18	0 57 9	0 59 57	1 3 7	1 6 16	1 9 35	1 12 57	1 16 17	1 19 58	1 23 40	1 27 22	1 31 15	1 35 8	1 39 11	1 43 14	1 47 20
19	0 55 50	0 58 35	1 1 37	1 4 44	1 7 58	1 11 14	1 14 28	1 18 3	1 21 39	1 25 15	1 29 2	1 32 48	1 36 45	1 40 41	1 44 42
20	0 54 33	0 57 16	1 0 11	1 3 15	1 6 24	1 9 34	1 12 43	1 16 12	1 19 42	1 23 12	1 26 53	1 30 33	1 34 24	1 38 13	1 42 15
21	0 53 21	0 56 0	0 58 41	1 1 49	1 4 53	1 7 58	1 11 2	1 14 26	1 17 51	1 21 16	1 24 51	1 28 25	1 32 11	1 35 54	1 39 50
22	0 52 12	0 54 47	0 57 30	1 0 26	1 3 26	1 6 26	1 9 25	1 12 44	1 16 4	1 19 24	1 22 53	1 26 21	1 30 2	1 33 39	1 37 29
23	0 51 5	0 53 35	0 56 14	0 59 4	1 2 0	1 4 56	1 7 50	1 11 4	1 14 19	1 17 34	1 20 58	1 24 20	1 27 56	1 31 27	1 35 11

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	3 16 49	3 24 25	3 32 8	3 39 56	3 47 50	3 55 53	4 4 2	4 12 17	4 20 40	4 29 8	4 37 43	4 46 23	4 55 8	5 4 1	5 12 59
1	3 9 6	3 16 23	3 23 46	3 31 18	3 38 56	3 46 43	3 54 36	4 2 35	4 10 41	4 18 52	4 27 9	4 35 28	4 43 51	4 52 27	5 1 8
2	3 1 51	3 8 54	3 16 3	3 23 19	3 30 41	3 38 12	3 45 49	3 53 32	4 1 22	4 9 16	4 17 16	4 25 24	4 33 35	4 41 53	4 50 18
3	2 55 12	3 2 1	3 8 55	3 15 57	3 23 5	3 30 21	3 37 43	3 45 12	3 52 48	4 0 28	4 8 13	4 16 6	4 24 1	4 32 5	4 40 15
4	2 48 59	2 55 34	3 2 13	3 9 1	3 15 55	3 22 56	3 30 3	3 37 19	3 44 41	3 52 7	3 59 38	4 7 17	4 14 58	4 22 47	4 30 42
5	2 43 8	2 49 30	2 55 56	3 2 31	3 9 11	3 15 58	3 22 50	3 29 53	3 37 1	3 44 14	3 51 31	3 58 57	4 6 25	4 14 0	4 21 40
6	2 37 39	2 43 49	2 50 3	2 56 26	3 2 54	3 9 29	3 16 9	3 22 58	3 29 51	3 36 51	3 43 55	3 51 7	3 58 20	4 5 42	4 13 8
7	2 32 33	2 38 32	2 44 34	2 50 46	2 57 2	3 3 25	3 9 53	3 16 28	3 23 7	3 29 55	3 36 46	3 43 47	3 50 48	3 57 58	4 5 12
8	2 27 44	2 33 34	2 39 27	2 45 28	2 51 32	2 57 43	3 3 59	3 10 27	3 16 59	3 23 33	3 30 9	3 36 57	3 43 45	3 50 43	3 57 44
9	2 23 13	2 28 53	2 34 35	2 40 25	2 46 17	2 52 18	2 58 23	3 4 36	3 10 52	3 17 19	3 23 47	3 30 24	3 37 1	3 43 48	3 50 38
10	2 18 58	2 24 27	2 29 57	2 35 36	2 41 17	2 47 8	2 53 3	2 59 6	3 5 11	3 11 25	3 17 40	3 24 8	3 30 35	3 37 13	3 43 54
11	2 14 58	2 20 15	2 25 33	2 31 2	2 36 33	2 42 14	2 47 59	2 53 52	2 59 47	3 5 49	3 11 51	3 18 8	3 24 23	3 31 0	3 37 30
12	2 11 8	2 16 15	2 21 23	2 26 43	2 32 4	2 37 36	2 43 11	2 48 55	2 54 40	3 0 31	3 6 22	3 12 29	3 18 33	3 25 1	3 31 21
13	2 7 27	2 12 26	2 17 25	2 22 36	2 27 48	2 33 11	2 38 37	2 44 12	2 49 47	2 55 29	3 1 11	3 7 9	3 13 3	3 19 19	3 25 27
14	2 3 55	2 8 47	2 13 39	2 18 42	2 23 45	2 28 59	2 34 16	2 39 42	2 45 7	2 50 42	2 56 16	3 2 5	3 7 50	3 13 53	3 19 48
15	2 0 31	2 5 18	2 10 4	2 14 59	2 19 54	2 25 0	2 30 8	2 35 25	2 40 41	2 46 9	2 51 36	2 57 17	3 2 53	3 8 44	3 14 23
16	1 57 13	2 1 57	2 6 40	2 11 28	2 16 15	2 21 13	2 26 13	2 31 22	2 36 30	2 41 50	2 47 8	2 52 42	2 58 11	3 3 52	3 9 24
17	1 54 14	1 58 51	2 3 26	2 8 7	2 12 46	2 17 37	2 22 29	2 27 31	2 32 31	2 37 42	2 42 51	2 48 18	2 53 40	2 59 13	3 4 37
18	1 51 24	1 55 54	2 0 21	2 4 55	2 9 27	2 14 11	2 18 55	2 23 50	2 28 42	2 33 45	2 38 45	2 44 5	2 49 19	2 54 44	3 0 0
19	1 48 41	1 53 4	1 57 24	2 1 51	2 6 16	2 10 53	2 15 29	2 20 17	2 25 1	2 29 57	2 34 49	2 40 1	2 45 7	2 50 24	2 55 32
20	1 46 14	1 50 26	1 54 34	1 58 55	2 3 13	2 7 43	2 12 11	2 16 52	2 21 28	2 26 17	2 31 2	2 36 6	2 41 3	2 46 13	2 51 13
21	1 43 42	1 47 47	1 51 48	1 56 3	2 0 14	2 4 38	2 9 0	2 13 35	2 18 4	2 22 46	2 27 23	2 32 19	2 37 7	2 42 10	2 47 3
22	1 41 15	1 45 14	1 49 9	1 53 18	1 57 22	2 1 40	2 5 55	2 10 24	2 14 46	2 19 21	2 23 51	2 28 39	2 33 19	2 38 16	2 43 2
23	1 38 51	1 42 45	1 46 35	1 50 38	1 54 36	1 58 47	2 2 55	2 7 17	2 11 32	2 16 2	2 20 26	2 25 7	2 29 39	2 34 30	2 39 9

LATITUDE 20° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 58	0 11 15	0 11 41	0 12 19	0 13 7	0 14 7	0 15 18	0 16 37	0 18 8	0 19 50	0 21 42	0 23 46	0 25 58	0 28 23	0 30 57
1	0 10 59	0 11 16	0 11 46	0 12 25	0 13 16	0 14 18	0 15 32	0 16 57	0 18 31	0 20 19	0 22 17	0 24 27	0 26 43	0 29 16	0 31 58
2	0 11 1	0 11 18	0 11 51	0 12 31	0 13 25	0 14 29	0 15 47	0 17 18	0 18 56	0 20 50	0 22 54	0 25 11	0 27 33	0 30 14	0 33 4
3	0 11 3	0 11 20	0 11 56	0 12 38	0 13 34	0 14 40	0 16 2	0 17 40	0 19 22	0 21 23	0 23 33	0 25 57	0 28 30	0 31 19	0 34 17
4	0 11 5	0 11 23	0 11 59	0 12 44	0 13 44	0 14 54	0 16 20	0 18 4	0 19 56	0 22 1	0 24 19	0 26 50	0 29 34	0 32 31	0 35 40
5	0 11 7	0 11 27	0 12 3	0 12 50	0 13 54	0 15 13	0 16 43	0 18 30	0 20 32	0 22 43	0 25 12	0 27 51	0 30 47	0 33 52	0 37 15
6	0 11 8	0 11 29	0 12 9	0 12 58	0 14 7	0 15 32	0 17 8	0 19 0	0 21 11	0 23 32	0 26 12	0 29 1	0 32 8	0 35 26	0 39 1
7	0 11 9	0 11 32	0 12 16	0 13 7	0 14 22	0 15 52	0 17 35	0 19 35	0 21 55	0 24 27	0 27 18	0 30 19	0 33 38	0 37 12	0 40 59
8	0 11 10	0 11 35	0 12 23	0 13 16	0 14 40	0 16 12	0 18 4	0 20 14	0 22 44	0 25 28	0 28 30	0 31 46	0 35 16	0 39 9	0 43 10
9	0 11 13	0 11 40	0 12 30	0 13 29	0 15 1	0 16 41	0 18 43	0 21 4	0 23 48	0 26 45	0 30 2	0 33 36	0 37 27	0 41 37	0 46 0
10	0 11 17	0 11 45	0 12 37	0 13 47	0 15 25	0 17 19	0 19 34	0 22 6	0 25 5	0 28 15	0 31 48	0 35 41	0 39 53	0 44 21	0 49 6
11	0 11 19	0 11 50	0 12 47	0 14 8	0 15 58	0 18 2	0 20 33	0 23 22	0 26 40	0 30 13	0 34 9	0 38 26	0 43 6	0 47 59	0 53 15
12	0 11 21	0 11 56	0 13 0	0 14 31	0 16 33	0 18 48	0 21 36	0 24 42	0 28 20	0 32 17	0 36 36	0 41 17	0 46 26	0 51 45	0 57 33
13	0 11 23	0 12 5	0 13 18	0 15 1	0 17 19	0 19 59	0 23 7	0 26 42	0 30 54	0 35 22	0 40 17	0 45 36	0 51 23	0 57 26	1 3 56
14	0 11 26	0 12 16	0 13 40	0 15 39	0 18 14	0 21 20	0 24 49	0 28 53	0 33 40	0 38 39	0 44 10	0 50 7	0 56 33	1 3 20	1 10 33
15	0 11 30	0 12 40	0 14 12	0 16 32	0 19 32	0 23 12	0 27 23	0 32 12	0 37 40	0 43 34	0 49 52	0 56 45	1 4 12	1 11 45	1 19 52
16	0 11 36	0 12 47	0 14 52	0 17 45	0 21 33	0 25 55	0 31 2	0 36 49	0 43 21	0 50 27	0 57 52	1 5 57	1 14 26	1 23 24	1 32 42
17	0 11 42	0 13 25	0 15 58	0 19 46	0 24 42	0 30 22	0 36 49	0 43 58	0 52 12	1 0 36	1 9 42	1 19 12	1 29 19	1 39 37	1 50 17
18	0 11 50	0 14 32	0 18 32	0 23 44	0 30 44	0 38 16	0 46 54	0 56 13	1 6 37	1 16 53	1 27 56	1 39 23	1 51 13	2 3 13	2 15 26
19	0 12 45	0 17 29	0 24 38	0 33 38	0 44 1	0 56 14	1 7 1	1 19 14	1 31 48	1 44 45	1 57 51	2 11 11	2 24 41	2 38 3	2 51 38
20	Not calculable.														
21	0 11 38	0 17 20	0 24 29	0 33 29	0 43 29	0 54 45	1 6 20	1 18 33	1 31 14	1 43 55	1 56 55	2 10 11	2 23 35	2 36 54	2 50 24
22	0 11 47	0 14 22	0 18 22	0 23 37	0 29 54	0 37 42	0 46 3	0 55 22	1 5 13	1 15 34	1 26 26	1 37 40	1 49 13	2 1 2	2 12 57
23	0 11 44	0 13 22	0 15 49	0 19 33	0 24 18	0 29 42	0 35 52	0 42 52	0 50 44	0 58 55	1 7 44	1 16 53	1 26 43	1 36 44	1 47 12

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 58	0 11 15	0 11 41	0 12 19	0 13 7	0 14 7	0 15 18	0 16 37	0 18 8	0 19 50	0 21 42	0 23 46	0 25 58	0 28 23	0 30 57
1	0 10 57	0 11 12	0 11 37	0 12 14	0 13 0	0 13 56	0 15 5	0 16 19	0 17 46	0 19 24	0 21 11	0 23 9	0 25 16	0 27 34	0 30 1
2	0 10 56	0 11 10	0 11 34	0 12 9	0 12 53	0 13 46	0 14 52	0 16 3	0 17 26	0 19 0	0 20 43	0 22 35	0 24 37	0 26 48	0 29 10
3	0 10 55	0 11 8	0 11 31	0 12 4	0 12 46	0 13 37	0 14 40	0 15 49	0 17 8	0 18 38	0 20 17	0 22 5	0 24 2	0 26 7	0 28 23
4	0 10 54	0 11 6	0 11 28	0 12 0	0 12 40	0 13 29	0 14 29	0 15 36	0 16 52	0 18 18	0 19 53	0 21 37	0 23 30	0 25 29	0 27 40
5	0 10 52	0 11 4	0 11 25	0 11 56	0 12 34	0 13 22	0 14 19	0 15 24	0 16 38	0 18 0	0 19 31	0 21 11	0 23 0	0 24 55	0 27 0
6	0 10 51	0 11 2	0 11 22	0 11 52	0 12 29	0 13 16	0 14 10	0 15 13	0 16 24	0 17 43	0 19 11	0 20 47	0 22 32	0 24 22	0 26 23
7	0 10 49	0 11 0	0 11 19	0 11 48	0 12 24	0 13 10	0 14 2	0 15 2	0 16 11	0 17 27	0 18 52	0 20 25	0 22 6	0 23 51	0 25 48
8	0 10 48	0 10 58	0 11 17	0 11 44	0 12 19	0 13 4	0 13 54	0 14 52	0 15 59	0 17 12	0 18 34	0 20 4	0 21 41	0 23 22	0 25 15
9	0 10 47	0 10 57	0 11 15	0 11 40	0 12 15	0 12 58	0 13 46	0 14 42	0 15 47	0 16 57	0 18 17	0 19 43	0 21 17	0 22 55	0 24 44
10	0 10 45	0 10 56	0 11 13	0 11 37	0 12 11	0 12 52	0 13 38	0 14 32	0 15 35	0 16 43	0 18 0	0 19 23	0 20 54	0 22 30	0 24 15
11	0 10 44	0 10 54	0 11 10	0 11 34	0 12 7	0 12 46	0 13 31	0 14 23	0 15 24	0 16 30	0 17 44	0 19 4	0 20 32	0 22 5	0 23 47
12	0 10 42	0 10 52	0 11 7	0 11 31	0 12 3	0 12 41	0 13 24	0 14 14	0 15 13	0 16 17	0 17 29	0 18 46	0 20 11	0 21 41	0 23 21
13	0 10 40	0 10 50	0 11 4	0 11 28	0 11 59	0 12 36	0 13 18	0 14 6	0 15 3	0 16 5	0 17 15	0 18 29	0 19 51	0 21 18	0 22 56
14	0 10 38	0 10 48	0 11 1	0 11 25	0 11 55	0 12 31	0 13 12	0 13 58	0 14 53	0 15 53	0 17 1	0 18 13	0 19 32	0 20 56	0 22 32
15	0 10 36	0 10 46	0 10 58	0 11 22	0 11 51	0 12 26	0 13 6	0 13 50	0 14 44	0 15 42	0 16 48	0 17 58	0 19 14	0 20 36	0 22 9
16	0 10 34	0 10 44	0 10 56	0 11 19	0 11 47	0 12 21	0 13 0	0 13 43	0 14 35	0 15 31	0 16 35	0 17 43	0 18 57	0 20 17	0 21 47
17	0 10 32	0 10 42	0 10 54	0 11 16	0 11 43	0 12 16	0 12 54	0 13 36	0 14 27	0 15 21	0 16 23	0 17 29	0 18 41	0 19 59	0 21 26
18	0 10 30	0 10 40	0 10 52	0 11 13	0 11 39	0 12 11	0 12 48	0 13 29	0 14 19	0 15 12	0 16 12	0 17 16	0 18 26	0 19 42	0 21 6
19	0 10 28	0 10 38	0 10 50	0 11 10	0 11 35	0 12 6	0 12 42	0 13 22	0 14 11	0 15 3	0 16 1	0 17 3	0 18 12	0 19 26	0 20 47
20	0 10 27	0 10 35	0 10 48	0 11 7	0 11 31	0 12 1	0 12 36	0 13 15	0 14 3	0 14 54	0 15 50	0 16 51	0 17 59	0 19 11	0 20 29
21	0 10 26	0 10 33	0 10 46	0 11 4	0 11 25	0 11 56	0 12 31	0 13 9	0 13 55	0 14 45	0 15 40	0 16 39	0 17 45	0 18 56	0 20 12
22	0 10 24	0 10 31	0 10 44	0 11 1	0 11 19	0 11 52	0 12 26	0 13 3	0 13 48	0 14 36	0 15 30	0 16 27	0 17 32	0 18 41	0 19 55
23	0 10 22	0 10 29	0 10 41	0 10 58	0 11 11	0 11 48	0 12 21	0 12 58	0 13 41	0 14 28	0 15 20	0 16 16	0 17 19	0 18 26	0 19 38

LATITUDE 20° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 33 41	0 36 36	0 39 40	0 42 54	0 46 19	0 49 54	0 53 38	0 57 33	1 1 37	1 5 49	1 10 12	1 14 44	1 19 24	1 24 15	1 29 14
1	0 34 51	0 37 55	0 41 9	0 44 32	0 48 6	0 51 50	0 55 45	0 59 51	1 4 6	1 8 31	1 13 5	1 17 50	1 22 43	1 27 47	1 33 0
2	0 36 7	0 39 20	0 42 45	0 46 17	0 50 1	0 53 57	0 58 3	1 2 21	1 6 48	1 11 26	1 16 12	1 21 12	1 26 19	1 31 37	1 37 4
3	0 37 29	0 40 52	0 44 28	0 48 10	0 52 5	0 56 15	1 0 33	1 5 4	1 9 44	1 14 36	1 19 36	1 24 51	1 30 12	1 35 45	1 41 28
4	0 39 1	0 42 36	0 46 22	0 50 18	0 54 27	0 58 51	1 3 23	1 8 8	1 13 1	1 18 10	1 23 25	1 28 56	1 34 30	1 40 24	1 46 23
5	0 40 46	0 44 35	0 48 33	0 52 45	0 57 8	1 1 46	1 6 33	1 11 33	1 16 43	1 22 11	1 27 42	1 33 29	1 39 25	1 45 35	1 51 51
6	0 42 45	0 46 50	0 51 2	0 55 30	1 0 10	1 5 5	1 10 9	1 15 29	1 20 57	1 26 44	1 32 32	1 38 40	1 44 59	1 51 29	1 58 7
7	0 44 59	0 49 21	0 53 50	0 58 34	1 3 34	1 8 48	1 14 10	1 19 51	1 25 40	1 31 47	1 37 56	1 44 25	1 51 7	1 57 58	2 4 59
8	0 47 28	0 52 9	0 56 58	1 1 59	1 7 22	1 12 56	1 18 38	1 24 40	1 30 53	1 37 22	1 43 57	1 50 48	1 57 55	2 5 8	2 12 34
9	0 50 41	0 55 42	1 0 56	1 6 22	1 12 7	1 18 6	1 24 17	1 30 45	1 37 24	1 44 20	1 51 24	1 58 42	2 6 14	2 13 56	2 21 53
10	0 54 10	0 59 32	1 5 12	1 11 4	1 17 11	1 23 35	1 30 16	1 37 11	1 44 17	1 51 41	1 59 14	2 7 0	2 14 58	2 23 9	2 31 37
11	0 58 48	1 4 41	1 10 51	1 17 15	1 23 57	1 30 59	1 38 11	1 45 40	1 53 20	2 1 19	2 9 28	2 17 48	2 26 22	2 35 10	2 44 9
12	1 3 36	1 10 0	1 16 41	1 23 37	1 30 54	1 38 34	1 46 18	1 54 21	2 2 38	2 11 10	2 19 55	2 28 50	2 38 0	2 47 25	2 56 56
13	1 10 39	1 17 48	1 25 17	1 32 58	1 41 0	1 49 25	1 57 54	2 6 41	2 15 41	2 24 57	2 34 27	2 44 7	2 54 0	3 4 1	3 14 16
14	1 17 56	1 25 51	1 34 9	1 42 35	1 51 22	2 0 32	2 9 47	2 19 19	2 29 3	2 39 4	2 49 19	2 59 44	3 10 20	3 20 58	3 31 58
15	1 27 25	1 37 25	1 46 27	1 55 54	2 5 40	2 15 37	2 25 48	2 36 21	2 46 58	2 57 49	3 8 55	3 20 3	3 31 27	3 42 55	3 54 40
16	1 42 20	1 52 20	2 2 41	2 13 12	2 23 53	2 34 53	2 46 14	2 57 41	3 9 11	3 20 52	3 32 52	3 44 55	3 57 2	4 9 17	4 21 43
17	2 1 17	2 12 39	2 24 14	2 35 50	2 47 43	2 59 54	3 12 13	3 24 33	3 37 2	3 49 40	4 2 31	4 15 18	4 28 5	4 41 6	4 54 17
18	2 27 49	2 40 29	2 53 15	3 6 9	3 19 3	3 32 17	3 45 35	3 58 44	4 11 58	4 25 26	4 38 58	4 52 32	5 6 1	5 18 32	5 33 13
19	3 5 14	3 18 50	3 32 41	3 46 33	4 0 21	4 14 1	4 27 54	4 41 49	4 55 47	5 94 44	5 23 44	5 37 40	5 51 38	6 5 33	6 19 33
20	Not calculable.														
21	3 3 54	3 17 24	3 31 14	3 44 52	3 58 36	4 12 18	4 26 1	4 39 50	4 53 43	5 7 32	5 21 23	5 35 14	5 49 1	6 2 58	6 16 50
22	2 25 20	2 37 44	2 50 20	3 3 4	3 15 48	3 28 46	3 41 46	3 54 51	4 8 3	4 21 14	4 34 30	4 47 49	5 1 13	5 14 36	5 28 0
23	1 57 53	2 8 53	2 20 2	2 31 39	2 43 14	2 55 2	3 7 10	3 19 12	3 31 23	3 43 43	3 56 13	4 8 45	4 21 18	4 33 57	4 46 49

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 33 41	0 36 36	0 39 40	0 42 54	0 46 19	0 49 54	0 53 38	0 57 33	1 1 37	1 5 49	1 10 12	1 14 44	1 19 24	1 24 15	1 29 14
1	0 32 38	0 35 26	0 38 23	0 41 30	0 44 47	0 48 13	0 51 47	0 55 32	0 59 26	1 3 28	1 7 39	1 12 0	1 16 28	1 21 7	1 25 54
2	0 31 40	0 34 21	0 37 11	0 40 11	0 43 20	0 46 38	0 50 3	0 53 39	0 57 24	1 1 16	1 5 16	1 9 27	1 13 43	1 18 11	1 22 47
3	0 30 47	0 33 21	0 36 4	0 38 57	0 41 58	0 45 9	0 48 25	0 51 52	0 55 28	0 59 12	1 3 3	1 7 4	1 11 9	1 15 27	1 19 52
4	0 29 58	0 32 26	0 35 2	0 37 48	0 40 41	0 43 45	0 46 53	0 50 12	0 53 39	0 57 16	1 0 58	1 4 50	1 8 46	1 12 55	1 17 9
5	0 29 13	0 31 35	0 34 5	0 36 43	0 39 29	0 42 26	0 45 27	0 48 39	0 51 57	0 55 27	0 59 0	1 2 44	1 6 34	1 10 35	1 14 38
6	0 28 31	0 30 48	0 33 12	0 35 43	0 38 22	0 41 12	0 44 7	0 47 12	0 50 23	0 53 46	0 57 11	1 0 46	1 4 31	1 8 23	1 12 19
7	0 27 52	0 30 4	0 32 23	0 34 47	0 37 20	0 40 4	0 42 53	0 45 52	0 48 56	0 52 12	0 55 30	0 58 57	1 2 37	1 6 21	1 10 10
8	0 27 15	0 29 22	0 31 37	0 33 56	0 36 24	0 39 2	0 41 45	0 44 38	0 47 36	0 50 45	0 53 57	0 57 17	1 0 50	1 4 26	1 8 9
9	0 26 40	0 28 43	0 30 54	0 33 9	0 35 33	0 38 5	0 40 43	0 43 30	0 46 22	0 49 24	0 52 31	0 55 44	0 59 9	1 2 37	1 6 14
10	0 26 7	0 28 6	0 30 13	0 32 25	0 34 45	0 37 12	0 39 46	0 42 27	0 45 14	0 48 10	0 51 11	0 54 18	0 57 34	1 0 54	1 4 25
11	0 25 36	0 27 31	0 29 34	0 31 44	0 34 0	0 36 22	0 38 52	0 41 29	0 44 10	0 47 1	0 49 54	0 52 56	0 56 5	0 59 19	1 2 44
12	0 25 7	0 26 59	0 28 58	0 31 5	0 33 17	0 35 34	0 38 0	0 40 33	0 43 10	0 45 56	0 48 41	0 51 38	0 54 41	0 57 50	1 1 9
13	0 24 40	0 26 29	0 28 24	0 30 28	0 32 37	0 34 49	0 37 11	0 39 40	0 42 13	0 44 54	0 47 32	0 50 24	0 53 21	0 56 25	0 59 39
14	0 24 14	0 26 0	0 27 52	0 29 52	0 31 59	0 34 6	0 36 24	0 38 49	0 41 18	0 43 54	0 46 26	0 49 12	0 52 4	0 55 3	0 58 12
15	0 23 48	0 25 31	0 27 21	0 29 17	0 31 22	0 33 24	0 35 38	0 37 59	0 40 24	0 42 55	0 45 22	0 48 3	0 50 50	0 53 44	0 56 48
16	0 23 23	0 25 3	0 26 50	0 28 43	0 30 46	0 32 43	0 34 51	0 37 10	0 39 31	0 41 57	0 44 20	0 46 57	0 49 39	0 52 28	0 55 27
17	0 22 59	0 24 36	0 26 20	0 28 10	0 30 11	0 32 3	0 34 7	0 36 22	0 38 39	0 41 1	0 43 21	0 45 54	0 48 31	0 51 15	0 54 9
18	0 22 36	0 24 10	0 25 51	0 27 38	0 29 36	0 31 24	0 33 24	0 35 35	0 37 48	0 40 6	0 42 24	0 44 53	0 47 26	0 50 5	0 52 54
19	0 22 14	0 23 45	0 25 23	0 27 6	0 29 2	0 30 46	0 32 42	0 34 49	0 36 58	0 39 12	0 41 29	0 43 54	0 46 23	0 48 58	0 51 42
20	0 21 53	0 23 21	0 24 56	0 26 35	0 28 29	0 30 8	0 32 3	0 34 4	0 36 9	0 38 19	0 40 36	0 42 57	0 45 23	0 47 54	0 50 33
21	0 21 33	0 22 59	0 24 32	0 26 4	0 27 56	0 29 36	0 31 28	0 33 25	0 35 27	0 37 33	0 39 46	0 42 3	0 44 26	0 46 53	0 49 27
22	0 21 14	0 22 37	0 24 9	0 25 34	0 27 24	0 29 4	0 30 54	0 32 47	0 34 46	0 36 49	0 38 59	0 41 12	0 43 32	0 45 55	0 48 24
23	0 20 55	0 22 16	0 23 44	0 25 5	0 26 52	0 28 33	0 30 21	0 32 11	0 34 7	0 36 7	0 38 14	0 40 24	0 42 39	0 44 59	0 47 23

LATITUDE 20° NORTH OR SOUTH.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 34 22	1 39 39	1 45 6	1 50 40	1 56 23	2 2 14	2 8 13	2 14 21	2 20 37	2 27 1	2 33 32	2 40 11	2 46 57	2 53 51	3 0 53
1	1 30 48	1 35 52	1 41 9	1 46 28	1 51 56	1 57 34	2 3 19	2 9 14	2 15 15	2 21 25	2 27 41	2 34 4	2 40 37	2 47 16	2 54 3
2	1 27 29	1 32 21	1 37 25	1 42 32	1 47 48	1 53 13	1 58 45	2 4 27	2 10 15	2 16 11	2 22 14	2 28 24	2 34 43	2 41 8	2 47 41
3	1 24 24	1 29 4	1 33 54	1 38 52	1 43 57	1 49 11	1 54 31	2 0 0	2 5 35	2 11 18	2 17 8	2 23 6	2 29 12	2 35 24	2 41 43
4	1 21 31	1 26 2	1 30 40	1 35 28	1 40 23	1 45 26	1 50 33	1 55 50	2 1 14	2 6 46	2 12 25	2 18 10	2 24 4	2 30 3	2 36 10
5	1 18 52	1 23 14	1 27 43	1 32 20	1 37 4	1 41 57	1 46 53	1 51 58	1 57 12	2 2 34	2 8 2	2 13 35	2 19 17	2 25 5	2 31 0
6	1 16 26	1 20 38	1 23 58	1 29 25	1 33 59	1 38 41	1 43 28	1 48 24	1 53 27	1 58 38	2 3 55	2 9 18	2 14 49	2 20 26	2 26 9
7	1 14 7	1 18 11	1 22 22	1 26 40	1 31 5	1 35 37	1 40 17	1 45 4	1 49 57	1 54 57	2 0 4	2 5 18	2 10 37	2 16 2	2 21 35
8	1 11 55	1 15 51	1 19 55	1 24 5	1 28 21	1 32 45	1 37 16	1 41 54	1 46 39	1 51 29	1 56 26	2 1 31	2 6 40	2 11 55	2 17 20
9	1 9 52	1 13 40	1 17 37	1 21 39	1 25 47	1 30 3	1 34 26	1 38 55	1 43 32	1 48 13	1 53 1	1 57 56	2 2 56	2 8 2	2 13 19
10	1 7 57	1 11 38	1 15 27	1 19 22	1 23 23	1 27 31	1 31 46	1 36 7	1 40 34	1 45 7	1 49 46	1 54 32	1 59 24	2 4 21	2 9 31
11	1 6 9	1 9 42	1 13 24	1 17 12	1 21 6	1 25 7	1 29 14	1 33 27	1 37 46	1 42 11	1 46 42	1 51 19	1 56 3	2 0 51	2 5 51
12	1 4 28	1 7 54	1 11 28	1 15 9	1 18 56	1 22 50	1 26 50	1 30 55	1 35 6	1 39 23	1 43 47	1 48 17	1 52 52	1 57 32	2 2 19
13	1 2 52	1 6 11	1 9 37	1 13 12	1 16 52	1 20 39	1 24 32	1 28 31	1 32 34	1 36 43	1 40 59	1 45 22	1 49 50	1 54 23	1 59 1
14	1 1 19	1 4 32	1 7 52	1 11 21	1 14 55	1 18 35	1 22 21	1 26 14	1 30 11	1 34 13	1 38 21	1 42 36	1 46 57	1 51 23	1 55 54
15	0 59 49	1 2 56	1 6 12	1 9 35	1 13 3	1 16 37	1 20 17	1 24 4	1 27 55	1 31 50	1 35 51	1 39 59	1 44 12	1 48 31	1 52 55
16	0 58 23	1 1 24	1 4 37	1 7 55	1 11 17	1 14 45	1 18 19	1 22 0	1 25 45	1 29 34	1 33 28	1 37 29	1 41 34	1 45 46	1 50 3
17	0 57 1	0 59 56	1 3 6	1 6 19	1 9 36	1 12 58	1 16 26	1 20 1	1 23 40	1 27 23	1 31 11	1 35 6	1 39 3	1 43 8	1 47 19
18	0 55 43	0 58 33	1 1 38	1 4 46	1 7 58	1 11 15	1 14 37	1 18 6	1 21 39	1 25 16	1 28 59	1 32 48	1 36 39	1 40 37	1 44 42
19	0 54 29	0 57 15	1 0 13	1 3 16	1 6 23	1 9 35	1 12 52	1 16 15	1 19 42	1 23 14	1 26 52	1 30 35	1 34 22	1 38 13	1 42 11
20	0 53 15	0 56 0	0 58 52	1 1 49	1 4 51	1 7 58	1 11 10	1 14 27	1 17 49	1 21 16	1 24 49	1 28 26	1 32 8	1 35 54	1 39 46
21	0 52 6	0 54 47	0 57 35	1 0 26	1 3 23	1 6 25	1 9 32	1 12 44	1 16 1	1 19 23	1 22 51	1 26 23	1 30 0	1 33 40	1 37 26
22	0 50 59	0 53 37	0 56 21	0 59 7	1 1 59	1 4 57	1 7 59	1 11 6	1 14 18	1 17 35	1 20 58	1 24 25	1 27 56	1 31 31	1 35 12
23	0 49 53	0 52 28	0 55 9	0 57 51	1 0 40	1 3 33	1 6 31	1 9 34	1 12 41	1 15 53	1 19 10	1 22 31	1 25 57	1 29 27	1 33 2

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	3 8 2	3 15 17	3 22 42	3 30 11	3 37 47	3 45 31	3 53 20	4 1 17	4 9 20	4 17 29	4 25 44	4 34 6	4 42 32	4 51 5	4 59 43
1	3 0 57	3 7 57	3 15 5	3 22 18	3 29 39	3 37 6	3 44 39	3 52 20	4 0 7	4 8 2	4 16 1	4 24 6	4 32 17	4 40 34	4 48 57
2	2 54 20	3 1 6	3 7 59	3 14 58	3 22 4	3 29 16	3 36 35	3 44 1	3 51 33	3 59 11	4 6 55	4 14 45	4 22 41	4 30 43	4 38 51
3	2 48 9	2 54 42	3 1 21	3 8 7	3 14 59	3 21 57	3 29 3	3 36 15	3 43 32	3 50 55	3 58 25	4 6 0	4 13 41	4 21 28	4 29 22
4	2 42 23	2 48 43	2 54 9	3 1 43	3 8 23	3 15 8	3 22 0	3 28 58	3 36 1	3 43 11	3 50 27	3 57 48	4 5 16	4 12 49	4 20 29
5	2 37 2	2 43 9	2 49 23	2 55 44	3 2 12	3 8 45	3 15 23	3 22 7	3 28 58	3 35 55	3 42 59	3 50 8	3 57 23	4 4 44	4 12 10
6	2 32 0	2 37 56	2 43 58	2 50 7	2 56 23	3 2 44	3 9 10	3 15 42	3 22 21	3 29 6	3 35 57	3 42 55	3 49 58	3 57 7	4 4 21
7	2 27 15	2 33 1	2 38 52	2 44 49	2 50 53	2 57 3	3 3 19	3 9 41	3 16 8	3 22 42	3 29 22	3 36 8	3 42 59	3 49 56	3 56 58
8	2 22 47	2 28 21	2 34 2	2 39 49	2 45 42	2 51 41	2 57 46	3 3 57	3 10 14	3 16 38	3 23 3	3 29 38	3 36 19	3 43 4	3 49 54
9	2 18 34	2 23 58	2 29 29	2 35 6	2 40 49	2 46 38	2 52 32	2 58 33	3 4 40	3 10 52	3 17 4	3 23 28	3 29 59	3 36 33	3 43 12
10	2 14 34	2 19 50	2 25 12	2 30 39	2 36 12	2 41 51	2 47 35	2 53 26	2 59 23	3 5 23	3 11 25	3 17 38	3 23 57	3 30 21	3 36 49
11	2 10 47	2 15 54	2 21 6	2 26 24	2 31 48	2 37 18	2 42 52	2 48 33	2 54 20	3 0 11	3 6 6	3 12 8	3 18 16	3 24 28	3 30 46
12	2 7 12	2 12 10	2 17 13	2 22 22	2 27 38	2 32 58	2 38 23	2 43 54	2 49 32	2 55 15	3 1 3	3 6 54	3 12 49	3 18 52	3 25 1
13	2 3 46	2 8 37	2 13 31	2 18 32	2 23 39	2 28 50	2 34 6	2 39 28	2 44 57	2 50 33	2 56 12	3 1 54	3 7 40	3 13 34	3 19 33
14	2 0 30	2 5 14	2 10 0	2 14 53	2 19 51	2 24 54	2 30 1	2 35 15	2 40 36	2 46 3	2 51 33	2 57 6	3 2 44	3 8 29	3 14 20
15	1 57 25	2 2 0	2 6 39	2 11 24	2 16 14	2 21 9	2 26 9	2 31 15	2 36 28	2 41 45	2 47 6	2 52 31	2 58 1	3 3 37	3 9 20
16	1 54 26	1 58 54	2 3 26	2 8 4	2 12 47	2 17 35	2 22 27	2 27 25	2 32 30	2 37 37	2 42 51	2 48 8	2 53 30	2 58 58	3 4 32
17	1 51 35	1 55 56	2 0 21	2 4 52	2 9 28	2 14 9	2 18 54	2 23 44	2 28 41	2 33 39	2 38 46	2 43 55	2 49 10	2 54 30	2 59 55
18	1 48 51	1 53 5	1 57 24	2 1 48	2 6 17	2 10 51	2 15 29	2 20 11	2 25 0	2 29 51	2 34 51	2 39 52	2 45 0	2 50 12	2 55 33
19	1 46 14	1 50 21	1 54 34	1 58 51	2 3 13	2 7 40	2 12 11	2 16 46	2 21 27	2 26 12	2 31 5	2 35 59	2 40 59	2 46 3	2 51 16
20	1 43 43	1 47 44	1 51 50	1 56 1	2 0 16	2 4 36	2 9 0	2 13 29	2 18 2	2 22 42	2 27 27	2 32 14	2 37 6	2 42 3	2 47 4
21	1 41 17	1 45 12	1 49 12	1 53 17	1 57 26	2 1 39	2 5 57	2 10 20	2 14 46	2 19 19	2 23 57	2 28 36	2 33 21	2 38 12	2 43 6
22	1 38 57	1 42 46	1 46 40	1 50 39	1 54 42	1 58 49	2 3 1	2 7 18	2 11 38	2 16 4	2 20 34	2 25 6	2 29 45	2 34 29	2 39 16
23	1 36 41	1 40 25	1 44 14	1 48 7	1 52 4	1 56 6	2 0 12	2 4 22	2 8 37	2 12 55	2 17 16	2 21 43	2 26 16	2 30 53	2 35 34

LATITUDE 21° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 11 0	0 11 16	0 11 40	0 12 16	0 13 2	0 13 59	0 15 5	0 16 22	0 17 48	0 19 25	0 21 11	0 23 8	0 25 15	0 27 31	0 29 57
1	0 11 1	0 11 17	0 11 43	0 12 21	0 13 9	0 14 8	0 15 15	0 16 36	0 18 7	0 19 50	0 21 41	0 23 44	0 25 56	0 28 20	0 30 53
2	0 11 2	0 11 18	0 11 47	0 12 26	0 13 17	0 14 18	0 15 27	0 16 53	0 18 29	0 20 17	0 22 13	0 24 23	0 26 40	0 29 12	0 31 52
3	0 11 3	0 11 19	0 11 51	0 12 31	0 13 25	0 14 28	0 15 42	0 17 13	0 18 53	0 20 47	0 22 49	0 25 5	0 27 27	0 30 7	0 32 54
4	0 11 5	0 11 23	0 11 55	0 12 37	0 13 34	0 14 41	0 16 1	0 17 35	0 19 20	0 21 20	0 23 30	0 25 52	0 28 23	0 31 10	0 34 7
5	0 11 7	0 11 26	0 12 0	0 12 43	0 13 43	0 14 56	0 16 24	0 18 1	0 19 52	0 21 57	0 24 15	0 26 45	0 29 29	0 32 24	0 35 32
6	0 11 8	0 11 29	0 12 4	0 12 50	0 13 54	0 15 12	0 16 47	0 18 29	0 20 28	0 22 39	0 25 6	0 27 45	0 30 40	0 33 46	0 37 5
7	0 11 9	0 11 31	0 12 8	0 12 58	0 14 7	0 15 30	0 17 10	0 18 59	0 21 7	0 23 26	0 26 3	0 28 52	0 31 58	0 35 16	0 38 47
8	0 11 10	0 11 33	0 12 13	0 13 8	0 14 21	0 15 49	0 17 33	0 19 32	0 21 51	0 24 20	0 27 8	0 30 9	0 33 26	0 36 57	0 40 41
9	0 11 12	0 11 37	0 12 20	0 13 30	0 14 38	0 16 13	0 18 6	0 20 15	0 22 43	0 25 26	0 28 25	0 31 41	0 35 16	0 39 2	0 43 4
10	0 11 15	0 11 41	0 12 29	0 13 33	0 14 58	0 16 42	0 18 44	0 21 4	0 23 42	0 26 40	0 29 51	0 33 23	0 37 17	0 41 18	0 45 39
11	0 11 16	0 11 44	0 12 37	0 13 49	0 15 22	0 17 15	0 19 29	0 22 4	0 24 57	0 28 11	0 31 42	0 35 33	0 39 47	0 44 14	0 48 58
12	0 11 17	0 11 48	0 12 48	0 14 7	0 15 51	0 17 53	0 20 20	0 23 11	0 26 20	0 29 51	0 33 43	0 37 54	0 42 29	0 47 22	0 52 30
13	0 11 19	0 11 56	0 13 2	0 14 28	0 16 27	0 18 46	0 21 31	0 24 43	0 28 17	0 32 15	0 36 35	0 41 15	0 46 23	0 51 48	0 57 29
14	0 11 22	0 12 8	0 13 19	0 14 53	0 17 9	0 19 46	0 22 50	0 26 24	0 30 24	0 34 49	0 39 37	0 44 47	0 50 29	0 56 26	1 2 41
15	0 11 26	0 12 16	0 13 39	0 15 35	0 18 1	0 21 10	0 24 42	0 28 42	0 33 20	0 38 20	0 43 49	0 49 42	0 56 5	1 2 47	1 9 56
16	0 11 30	0 12 30	0 14 10	0 16 28	0 19 25	0 22 59	0 27 12	0 31 55	0 37 23	0 43 4	0 49 28	0 56 16	1 3 40	1 11 15	1 19 13
17	0 11 36	0 12 45	0 14 49	0 17 42	0 21 30	0 25 45	0 30 47	0 36 33	0 42 59	0 49 57	0 57 27	1 5 21	1 13 44	1 22 38	1 31 49
18	0 11 43	0 13 22	0 15 58	0 19 44	0 24 39	0 30 14	0 36 36	0 43 42	0 51 36	1 0 5	1 9 1	1 18 31	1 28 31	1 38 43	1 49 19
19	0 11 47	0 14 27	0 18 27	0 23 44	0 30 22	0 37 54	0 46 32	0 55 47	1 6 3	1 16 23	1 27 13	1 38 34	1 50 13	2 2 9	2 14 15
20	0 11 38	0 17 20	0 24 29	0 33 29	0 43 29	0 54 45	1 6 20	1 18 33	1 31 14	1 43 55	1 56 55	2 10 11	2 23 35	2 36 54	2 50 24
21	Not calculable.														
22	0 12 50	0 17 29	0 24 14	0 32 50	0 43 29	0 54 14	1 5 54	1 17 43	1 30 33	1 43 4	1 55 55	2 9 4	2 22 20	2 35 35	2 48 51
23	0 12 13	0 14 27	0 18 13	0 23 22	0 29 47	0 37 16	0 45 42	0 54 44	1 4 42	1 14 47	1 25 40	1 36 45	1 48 19	1 59 59	2 11 47

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 11 0	0 11 16	0 11 40	0 12 16	0 13 2	0 13 59	0 15 5	0 16 22	0 17 48	0 19 25	0 21 11	0 23 8	0 25 15	0 27 31	0 29 57
1	0 10 58	0 11 13	0 11 36	0 12 11	0 12 55	0 13 50	0 14 52	0 16 5	0 17 28	0 19 0	0 20 41	0 22 33	0 24 36	0 26 46	0 29 6
2	0 10 56	0 11 10	0 11 32	0 12 6	0 12 48	0 13 41	0 14 40	0 15 50	0 17 10	0 18 38	0 20 14	0 22 1	0 24 0	0 26 5	0 28 19
3	0 10 54	0 11 7	0 11 29	0 12 1	0 12 41	0 13 32	0 14 29	0 15 36	0 16 53	0 18 17	0 19 50	0 21 32	0 23 27	0 25 27	0 27 36
4	0 10 52	0 11 5	0 11 26	0 11 56	0 12 35	0 13 24	0 14 19	0 15 23	0 16 37	0 17 58	0 19 28	0 21 6	0 22 56	0 24 52	0 26 56
5	0 10 51	0 11 3	0 11 23	0 11 52	0 12 29	0 13 16	0 14 10	0 15 11	0 16 22	0 17 41	0 19 8	0 20 42	0 22 27	0 24 19	0 26 19
6	0 10 50	0 11 1	0 11 20	0 11 48	0 12 24	0 13 9	0 14 1	0 15 0	0 16 8	0 17 25	0 18 49	0 20 20	0 22 0	0 23 48	0 25 45
7	0 10 49	0 10 59	0 11 17	0 11 44	0 12 19	0 13 3	0 13 52	0 14 49	0 15 55	0 17 10	0 18 31	0 19 59	0 21 35	0 23 19	0 25 12
8	0 10 47	0 10 57	0 11 14	0 11 40	0 12 15	0 12 57	0 13 44	0 14 39	0 15 43	0 16 56	0 18 14	0 19 39	0 21 12	0 22 52	0 24 41
9	0 10 45	0 10 55	0 11 12	0 11 36	0 12 11	0 12 51	0 13 37	0 14 30	0 15 32	0 16 42	0 17 58	0 19 20	0 20 50	0 22 27	0 24 12
10	0 10 43	0 10 53	0 11 10	0 11 33	0 12 7	0 12 45	0 13 30	0 14 22	0 15 22	0 16 29	0 17 42	0 19 2	0 20 30	0 22 4	0 23 45
11	0 10 41	0 10 51	0 11 7	0 11 30	0 12 3	0 12 40	0 13 23	0 14 14	0 15 12	0 16 17	0 17 27	0 18 45	0 20 11	0 21 42	0 23 19
12	0 10 39	0 10 49	0 11 4	0 11 27	0 11 59	0 12 35	0 13 17	0 14 6	0 15 2	0 16 5	0 17 13	0 18 29	0 19 53	0 21 21	0 22 55
13	0 10 37	0 10 47	0 11 1	0 11 24	0 11 55	0 12 30	0 13 11	0 13 59	0 14 53	0 15 54	0 17 0	0 18 14	0 19 35	0 21 1	0 22 32
14	0 10 35	0 10 45	0 10 59	0 11 21	0 11 51	0 12 25	0 13 5	0 13 52	0 14 44	0 15 43	0 16 47	0 17 59	0 19 18	0 20 41	0 22 10
15	0 10 33	0 10 43	0 10 57	0 11 19	0 11 47	0 12 20	0 12 59	0 13 45	0 14 35	0 15 32	0 16 35	0 17 45	0 19 2	0 20 22	0 21 49
16	0 10 31	0 10 41	0 10 55	0 11 15	0 11 43	0 12 15	0 12 53	0 13 38	0 14 27	0 15 22	0 16 23	0 17 31	0 18 46	0 20 4	0 21 28
17	0 10 29	0 10 39	0 10 53	0 11 12	0 11 39	0 12 10	0 12 47	0 13 31	0 14 19	0 15 12	0 16 12	0 17 18	0 18 31	0 19 47	0 21 8
18	0 10 27	0 10 37	0 10 51	0 11 9	0 11 35	0 12 5	0 12 41	0 13 24	0 14 11	0 15 3	0 16 1	0 17 5	0 18 16	0 19 30	0 20 49
19	0 10 26	0 10 35	0 10 49	0 11 6	0 11 31	0 12 1	0 12 36	0 13 17	0 14 3	0 14 54	0 15 50	0 16 52	0 18 1	0 19 13	0 20 30
20	0 10 25	0 10 33	0 10 47	0 11 4	0 11 28	0 11 57	0 12 31	0 13 10	0 13 55	0 14 45	0 15 40	0 16 40	0 17 47	0 18 57	0 20 12
21	0 10 24	0 10 31	0 10 44	0 11 1	0 11 25	0 11 52	0 12 26	0 13 4	0 13 47	0 14 36	0 15 30	0 16 28	0 17 33	0 18 41	0 19 55
22	0 10 22	0 10 29	0 10 41	0 10 58	0 11 22	0 11 48	0 12 21	0 12 58	0 13 40	0 14 28	0 15 20	0 16 17	0 17 20	0 18 26	0 19 39
23	0 10 20	0 10 27	0 10 37	0 10 55	0 11 18	0 11 44	0 12 16	0 12 52	0 13 33	0 14 20	0 15 10	0 16 6	0 17 7	0 18 12	0 19 23

LATITUDE 21° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 32 32	0 35 19	0 38 14	0 41 19	0 44 33	0 47 59	0 51 31	0 55 14	0 59 6	1 3 7	1 7 17	1 11 35	1 16 3	1 20 40	1 25 25
1	0 33 36	0 36 31	0 39 34	0 42 43	0 46 6	0 49 41	0 53 23	0 57 16	1 1 18	1 5 31	1 9 49	1 14 19	1 18 59	1 23 48	1 28 45
2	0 34 43	0 37 46	0 40 58	0 44 16	0 47 48	0 51 33	0 55 26	0 59 30	1 3 43	1 8 8	1 12 37	1 17 20	1 22 13	1 27 15	1 32 25
3	0 35 54	0 39 6	0 42 28	0 45 59	0 49 41	0 53 36	0 57 41	1 1 57	1 6 21	1 10 59	1 15 42	1 20 38	1 25 45	1 31 1	1 36 26
4	0 37 16	0 40 39	0 44 11	0 47 54	0 51 47	0 55 56	1 0 12	1 4 41	1 9 17	1 14 9	1 19 7	1 24 19	1 29 39	1 35 9	1 40 48
5	0 38 50	0 42 26	0 46 8	0 50 4	0 54 10	0 58 33	1 3 1	1 7 45	1 12 35	1 17 41	1 22 54	1 28 22	1 33 56	1 39 42	1 45 42
6	0 40 35	0 44 23	0 48 19	0 52 29	0 56 49	1 1 28	1 6 10	1 11 11	1 16 17	1 21 39	1 27 10	1 32 54	1 38 46	1 44 50	1 51 8
7	0 42 31	0 46 32	0 50 45	0 55 11	0 59 47	1 4 43	1 9 40	1 14 59	1 20 23	1 26 4	1 31 55	1 37 57	1 44 10	1 50 33	1 57 11
8	0 44 42	0 48 57	0 53 29	0 58 10	1 3 4	1 8 18	1 13 34	1 19 12	1 24 56	1 30 58	1 37 11	1 43 33	1 50 10	1 56 54	2 3 54
9	0 47 23	0 51 58	0 56 50	1 1 51	1 7 8	1 12 41	1 18 23	1 24 23	1 30 32	1 36 57	1 43 35	1 50 21	1 57 23	2 4 33	2 11 57
10	0 50 16	0 55 11	1 0 23	1 5 44	1 11 24	1 17 17	1 23 25	1 29 48	1 36 22	1 43 11	1 50 14	1 57 25	2 4 52	2 12 29	2 20 17
11	0 53 59	0 59 22	1 4 59	1 10 48	1 16 56	1 23 19	1 29 56	1 36 50	1 43 54	1 51 13	1 58 48	2 6 29	2 14 27	2 22 34	2 30 56
12	0 57 56	1 3 47	1 9 50	1 16 7	1 22 44	1 29 38	1 36 45	1 44 11	1 51 45	1 59 35	2 7 42	2 15 54	2 24 23	2 33 1	2 41 57
13	1 3 32	1 10 0	1 16 39	1 23 34	1 30 50	1 38 22	1 46 9	1 54 13	2 2 26	2 10 56	2 19 40	2 28 33	2 37 40	2 46 57	2 56 29
14	1 9 21	1 16 29	1 23 42	1 31 16	1 39 11	1 47 22	1 55 49	2 4 31	2 13 24	2 22 34	2 31 55	2 41 30	2 51 15	3 1 12	3 11 21
15	1 17 18	1 25 9	1 33 14	1 41 42	1 50 25	1 59 23	2 8 39	2 18 3	2 27 49	2 37 42	2 47 50	2 58 12	3 8 43	3 19 20	3 30 10
16	1 27 38	1 36 29	1 45 36	1 54 55	2 4 31	2 14 21	2 24 37	2 34 57	2 45 33	2 56 16	3 7 13	3 18 23	3 29 40	3 41 1	3 52 40
17	1 41 26	1 51 29	2 1 33	2 11 53	2 22 37	2 33 37	2 44 47	2 56 9	3 7 35	3 19 12	3 30 59	3 42 59	3 55 4	4 7 11	4 19 31
18	2 0 14	2 11 27	2 22 47	2 34 32	2 46 23	2 58 23	3 10 41	3 22 45	3 35 13	3 47 45	4 0 27	4 13 12	4 25 56	4 38 51	4 51 56
19	2 26 35	2 39 4	2 51 54	3 4 44	3 17 35	3 30 35	3 43 42	3 56 51	4 10 7	4 23 22	4 36 46	4 50 9	5 3 41	5 17 3	5 30 45
20	3 3 54	3 17 24	3 31 14	3 44 52	3 58 36	4 12 18	4 26 1	4 39 50	4 53 43	5 7 32	5 21 23	5 35 14	5 49 1	6 2 58	6 16 50
21	Not calculable.														
22	3 2 20	3 15 46	3 29 27	3 43 2	3 56 43	4 10 21	4 23 56	4 37 49	4 51 32	5 5 12	5 18 59	5 32 46	5 46 31	6 0 17	6 14 1
23	2 23 51	2 36 13	2 48 47	3 1 23	3 14 0	3 26 49	3 39 55	3 52 49	4 5 55	4 18 55	4 32 7	4 45 24	4 58 45	5 11 49	5 25 16

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 32 32	0 35 19	0 38 14	0 41 19	0 44 33	0 47 59	0 51 31	0 55 14	0 59 6	1 3 7	1 7 17	1 11 35	1 16 3	1 20 40	1 25 25
1	0 31 36	0 34 16	0 37 3	0 40 1	0 43 7	0 46 25	0 49 49	0 53 23	0 57 6	1 0 58	1 4 58	1 9 5	1 13 22	1 17 47	1 22 21
2	0 30 44	0 33 17	0 35 57	0 38 48	0 41 46	0 44 57	0 48 14	0 51 39	0 55 13	0 58 57	1 2 47	1 6 45	1 10 51	1 15 6	1 19 30
3	0 29 55	0 32 22	0 34 56	0 37 40	0 40 31	0 43 35	0 46 44	0 50 1	0 53 27	0 57 3	1 0 44	1 4 34	1 8 30	1 12 36	1 16 51
4	0 29 9	0 31 31	0 33 59	0 36 37	0 39 21	0 42 18	0 45 20	0 48 30	0 51 48	0 55 16	0 58 49	1 2 31	1 6 19	1 10 16	1 14 22
5	0 28 26	0 30 43	0 33 6	0 35 38	0 38 16	0 41 6	0 44 1	0 47 5	0 50 15	0 53 35	0 57 1	1 0 36	1 4 17	1 8 5	1 12 3
6	0 27 46	0 29 58	0 32 16	0 34 43	0 37 16	0 39 59	0 42 47	0 45 45	0 48 49	0 52 2	0 55 21	0 58 48	1 2 23	1 6 2	1 9 53
7	0 27 9	0 29 16	0 31 30	0 33 52	0 36 20	0 38 57	0 41 38	0 44 30	0 47 28	0 50 35	0 53 47	0 57 7	1 0 37	1 4 7	1 7 52
8	0 26 34	0 28 37	0 30 47	0 33 4	0 35 28	0 37 59	0 40 34	0 43 21	0 46 13	0 49 14	0 52 20	0 55 33	0 58 57	1 2 19	1 5 58
9	0 26 2	0 28 1	0 30 7	0 32 19	0 34 39	0 37 5	0 39 36	0 42 17	0 45 4	0 47 59	0 50 59	0 54 6	0 57 23	1 0 37	1 4 11
10	0 25 32	0 27 27	0 29 29	0 31 36	0 33 53	0 36 14	0 38 43	0 41 18	0 44 0	0 46 49	0 49 44	0 52 45	0 55 54	0 59 1	1 2 30
11	0 25 4	0 26 55	0 28 53	0 30 57	0 33 9	0 35 26	0 37 51	0 40 22	0 43 0	0 45 43	0 48 33	0 51 28	0 54 30	0 57 31	1 0 54
12	0 24 37	0 26 25	0 28 19	0 30 20	0 32 27	0 34 40	0 37 1	0 39 28	0 42 2	0 44 40	0 47 25	0 50 15	0 53 11	0 56 6	0 59 23
13	0 24 11	0 25 56	0 27 47	0 29 45	0 31 47	0 33 56	0 36 13	0 38 36	0 41 6	0 43 40	0 46 20	0 49 5	0 51 55	0 54 45	0 57 56
14	0 23 46	0 25 28	0 27 16	0 29 11	0 31 9	0 33 14	0 35 27	0 37 46	0 40 12	0 42 42	0 45 18	0 47 58	0 50 42	0 53 28	0 56 33
15	0 23 22	0 25 1	0 26 46	0 28 38	0 30 33	0 32 34	0 34 43	0 36 58	0 39 20	0 41 46	0 44 18	0 46 54	0 49 32	0 52 15	0 55 14
16	0 22 59	0 24 35	0 26 17	0 28 6	0 29 58	0 31 56	0 34 1	0 36 12	0 38 30	0 40 52	0 43 20	0 45 52	0 48 25	0 51 5	0 53 58
17	0 22 36	0 24 10	0 25 49	0 27 35	0 29 25	0 31 20	0 33 21	0 35 28	0 37 42	0 40 0	0 42 24	0 44 52	0 47 21	0 49 58	0 52 46
18	0 22 14	0 23 46	0 25 22	0 27 5	0 28 53	0 30 45	0 32 42	0 34 46	0 36 56	0 39 10	0 41 30	0 43 54	0 46 20	0 48 54	0 51 37
19	0 21 53	0 23 22	0 24 56	0 26 36	0 28 21	0 30 11	0 32 5	0 34 5	0 36 11	0 38 22	0 40 38	0 42 58	0 45 22	0 47 53	0 50 31
20	0 21 33	0 22 59	0 24 32	0 26 8	0 27 50	0 29 37	0 31 28	0 33 25	0 35 27	0 37 35	0 39 47	0 42 4	0 44 26	0 46 54	0 49 27
21	0 21 14	0 22 37	0 24 8	0 25 42	0 27 21	0 29 5	0 30 53	0 32 47	0 34 46	0 36 50	0 38 59	0 41 13	0 43 32	0 45 57	0 48 26
22	0 20 55	0 22 16	0 23 45	0 25 16	0 26 53	0 28 34	0 30 20	0 32 11	0 34 7	0 36 8	0 38 14	0 40 24	0 42 40	0 45 1	0 47 26
23	0 20 37	0 21 56	0 23 22	0 24 51	0 26 25	0 28 4	0 29 48	0 31 37	0 33 30	0 35 28	0 37 31	0 39 38	0 41 50	0 44 6	0 46 28

LATITUDE 21° NORTH OR SOUTH.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 30 19	1 35 23	1 40 34	1 45 52	1 51 20	1 56 56	2 2 38	2 8 31	2 14 31	2 20 38	2 26 52	2 33 15	2 39 44	2 46 21	2 53 5
1	1 27 3	1 31 47	1 36 46	1 41 52	1 47 8	1 52 37	1 58 7	2 3 48	2 9 36	2 15 29	2 21 30	2 27 39	2 33 55	2 40 18	2 46 49
2	1 24 1	1 28 30	1 33 18	1 38 13	1 43 18	1 48 38	1 53 56	1 59 25	2 5 1	2 10 41	2 16 30	2 22 26	2 28 30	2 34 39	2 40 57
3	1 21 11	1 25 31	1 30 9	1 34 53	1 39 47	1 44 56	1 50 3	1 55 21	2 0 45	2 6 13	2 11 50	2 17 34	2 23 26	2 29 13	2 35 28
4	1 18 33	1 22 47	1 27 16	1 31 51	1 36 34	1 41 29	1 46 26	1 51 33	1 56 46	2 2 3	2 7 29	2 13 1	2 18 41	2 24 17	2 30 20
5	1 16 6	1 20 18	1 24 38	1 29 4	1 33 37	1 38 17	1 43 5	1 48 1	1 53 3	1 58 10	2 3 25	2 8 46	2 14 14	2 19 49	2 25 31
6	1 13 49	1 17 59	1 22 10	1 26 27	1 30 50	1 35 17	1 39 55	1 44 42	1 49 34	1 54 32	1 59 37	2 4 47	2 10 4	2 15 29	2 21 0
7	1 11 42	1 15 46	1 19 49	1 23 57	1 28 12	1 32 27	1 36 56	1 41 34	1 46 17	1 51 6	1 56 2	2 1 3	2 6 11	2 11 25	2 16 46
8	1 9 42	1 13 37	1 17 32	1 21 32	1 25 40	1 29 47	1 34 7	1 38 37	1 43 11	1 47 52	1 52 39	1 57 31	2 2 30	2 7 35	2 12 47
9	1 7 49	1 11 32	1 15 20	1 19 13	1 23 14	1 27 16	1 31 28	1 35 49	1 40 15	1 44 48	1 49 26	1 54 10	1 59 1	2 3 57	2 9 0
10	1 6 3	1 9 31	1 13 13	1 17 0	1 20 54	1 24 53	1 28 59	1 33 10	1 37 28	1 41 53	1 46 23	1 50 59	1 55 42	2 0 30	2 5 25
11	1 4 22	1 7 37	1 11 14	1 14 55	1 18 42	1 22 38	1 26 36	1 30 39	1 34 49	1 39 6	1 43 29	1 47 57	1 52 33	1 57 14	2 2 0
12	1 2 45	1 5 50	1 9 22	1 12 57	1 16 38	1 20 29	1 24 20	1 28 16	1 32 19	1 36 29	1 40 45	1 45 5	1 49 33	1 54 7	1 58 45
13	1 1 12	1 4 10	1 7 37	1 11 7	1 14 42	1 18 26	1 22 11	1 26 1	1 29 57	1 34 0	1 38 9	1 42 22	1 46 42	1 51 9	1 55 39
14	0 59 43	1 2 37	1 5 59	1 9 24	1 12 53	1 16 29	1 20 8	1 23 52	1 27 42	1 31 38	1 35 40	1 39 47	1 43 59	1 48 19	1 52 42
15	0 58 18	1 1 10	1 4 27	1 7 47	1 11 10	1 14 38	1 18 11	1 21 50	1 25 34	1 29 23	1 33 18	1 37 19	1 41 24	1 45 37	1 49 53
16	0 56 57	0 59 47	1 2 58	1 6 13	1 9 31	1 12 52	1 16 19	1 19 53	1 23 31	1 27 14	1 31 2	1 34 57	1 38 56	1 43 3	1 47 13
17	0 55 40	0 58 28	1 1 33	1 4 42	1 7 55	1 11 10	1 14 32	1 18 1	1 21 33	1 25 11	1 28 53	1 32 41	1 36 34	1 40 35	1 44 39
18	0 54 26	0 57 12	1 0 11	1 3 14	1 6 22	1 9 32	1 12 49	1 16 12	1 19 39	1 23 12	1 26 49	1 30 30	1 34 17	1 38 12	1 42 10
19	0 53 14	0 55 58	0 58 52	1 1 49	1 4 52	1 7 58	1 11 10	1 14 27	1 17 49	1 21 17	1 24 49	1 28 24	1 32 5	1 35 54	1 39 46
20	0 52 4	0 54 47	0 57 35	1 0 27	1 3 25	1 6 28	1 9 35	1 12 46	1 16 3	1 19 26	1 22 53	1 26 23	1 29 59	1 33 41	1 37 27
21	0 50 59	0 53 38	0 56 21	0 59 8	1 2 1	1 5 1	1 8 3	1 11 9	1 14 21	1 17 39	1 21 1	1 24 27	1 27 58	1 31 33	1 35 13
22	0 49 56	0 52 31	0 55 10	0 57 53	1 0 41	1 3 36	1 6 34	1 9 36	1 12 43	1 15 56	1 19 13	1 22 34	1 26 0	1 29 30	1 33 5
23	0 48 54	0 51 25	0 54 0	0 56 40	0 59 25	1 2 14	1 5 8	1 8 6	1 11 9	1 14 16	1 17 28	1 20 45	1 24 6	1 27 31	1 31 1

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	2 59 56	3 6 55	3 14 0	3 21 12	3 28 30	3 35 56	3 43 28	3 51 6	3 58 51	4 6 41	4 14 38	4 22 41	4 30 49	4 39 5	4 47 25
1	2 53 27	3 0 12	3 7 2	3 13 59	3 21 2	3 28 12	3 35 28	3 42 50	3 50 20	3 57 55	4 5 35	4 13 22	4 21 16	4 29 16	4 37 21
2	2 47 22	2 53 53	3 0 29	3 7 12	3 14 2	3 20 58	3 28 0	3 35 8	3 42 22	3 49 42	3 57 7	4 4 39	4 12 20	4 20 4	4 27 54
3	2 41 40	2 47 58	2 54 21	3 0 51	3 7 28	3 14 11	3 21 0	3 27 55	3 34 55	3 42 1	3 49 12	3 56 30	4 3 58	4 11 28	4 19 4
4	2 36 20	2 42 26	2 48 37	2 54 55	3 1 20	3 7 51	3 14 28	3 21 11	3 27 59	3 34 52	3 41 50	3 48 55	3 56 11	4 3 28	4 10 51
5	2 31 20	2 37 15	2 43 15	2 49 22	2 55 36	3 1 56	3 8 22	3 14 54	3 21 31	3 28 12	3 34 58	3 41 52	3 48 55	3 56 2	4 3 13
6	2 26 39	2 32 23	2 38 12	2 44 9	2 50 12	2 56 23	3 2 38	3 8 57	3 15 23	3 21 54	3 28 30	3 35 12	3 42 2	3 48 57	3 55 56
7	2 22 15	2 27 49	2 33 28	2 39 14	2 45 7	2 51 6	2 57 10	3 3 19	3 9 34	3 15 55	3 22 21	3 28 52	3 35 30	3 42 13	3 49 0
8	2 18 6	2 23 30	2 28 59	2 34 34	2 40 17	2 46 5	2 51 59	2 57 58	3 4 3	3 10 14	3 16 30	3 22 51	3 29 18	3 35 50	3 42 25
9	2 14 10	2 19 24	2 24 44	2 30 9	2 35 42	2 41 20	2 47 4	2 52 53	2 58 48	3 4 49	3 10 55	3 17 6	3 23 23	3 29 44	3 36 7
10	2 10 25	2 15 30	2 20 41	2 25 58	2 31 21	2 36 50	2 42 24	2 48 3	2 53 48	2 59 39	3 5 35	3 11 37	3 17 44	3 23 54	3 30 7
11	2 6 51	2 11 48	2 16 51	2 22 0	2 27 14	2 32 33	2 37 58	2 43 28	2 49 4	2 54 46	3 0 33	3 6 24	3 12 21	3 18 21	3 24 26
12	2 3 28	2 8 17	2 13 12	2 18 13	2 23 19	2 28 28	2 33 45	2 39 6	2 44 34	2 50 7	2 55 45	3 1 26	3 7 14	3 13 4	3 19 1
13	2 0 15	2 4 56	2 9 43	2 14 36	2 19 34	2 24 35	2 29 43	2 34 57	2 40 17	2 45 41	2 51 10	2 56 42	3 2 21	3 8 2	3 13 51
14	1 57 11	2 1 45	2 6 24	2 11 9	2 15 59	2 20 53	2 25 53	2 30 59	2 36 11	2 41 26	2 46 46	2 52 10	2 57 40	3 3 12	3 8 53
15	1 54 15	1 58 42	2 3 15	2 7 52	2 12 34	2 17 21	2 22 13	2 27 11	2 32 15	2 37 22	2 42 33	2 47 49	2 53 11	2 58 39	3 4 12
16	1 51 28	1 55 48	2 0 13	2 4 43	2 9 17	2 13 58	2 18 43	2 23 34	2 28 31	2 33 31	2 38 31	2 43 39	2 48 53	2 54 13	2 59 38
17	1 48 47	1 53 0	1 57 18	2 1 41	2 6 8	2 10 43	2 15 21	2 20 5	2 24 55	2 29 48	2 34 39	2 39 40	2 44 46	2 49 58	2 55 15
18	1 46 12	1 50 18	1 54 30	1 58 46	2 3 7	2 7 35	2 12 6	2 16 43	2 21 26	2 26 12	2 30 56	2 35 50	2 40 49	2 45 53	2 51 2
19	1 43 42	1 47 42	1 51 48	1 55 58	2 0 13	2 4 34	2 8 58	2 13 28	2 18 4	2 22 43	2 27 22	2 32 9	2 37 1	2 41 57	2 46 59
20	1 41 17	1 45 12	1 49 12	1 53 17	1 57 26	2 1 40	2 5 58	2 10 21	2 14 49	2 19 21	2 23 57	2 28 37	2 33 22	2 38 11	2 43 5
21	1 38 58	1 42 47	1 46 42	1 50 41	1 54 44	1 58 52	2 3 4	2 7 21	2 11 42	2 16 8	2 20 38	2 25 12	2 29 50	2 34 32	2 39 19
22	1 36 44	1 40 28	1 44 17	1 48 10	1 52 8	1 56 10	2 0 16	2 4 27	2 8 42	2 13 1	2 17 25	2 21 53	2 26 24	2 31 0	2 35 40
23	1 34 35	1 38 14	1 41 58	1 45 45	1 49 37	1 53 33	1 57 33	2 1 38	2 5 47	2 10 0	2 14 18	2 18 40	2 23 5	2 27 34	2 32 7

LATITUDE 22° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 56	0 11 11	0 11 34	0 12 9	0 12 52	0 13 45	0 14 49	0 16 1	0 17 23	0 18 56	0 20 36	0 22 28	0 24 28	0 26 38	0 28 57
1	0 10 57	0 11 12	0 11 37	0 12 13	0 12 59	0 13 54	0 15 0	0 16 15	0 17 40	0 19 20	0 21 4	0 23 1	0 25 4	0 27 22	0 29 46
2	0 10 58	0 11 14	0 11 41	0 12 17	0 13 7	0 14 3	0 15 13	0 16 31	0 18 0	0 19 45	0 21 34	0 23 37	0 25 45	0 28 10	0 30 40
3	0 11 0	0 11 16	0 11 45	0 12 22	0 13 15	0 14 13	0 15 27	0 16 49	0 18 22	0 20 12	0 22 6	0 24 15	0 26 30	0 29 3	0 31 39
4	0 11 2	0 11 19	0 11 47	0 12 27	0 13 22	0 14 24	0 15 43	0 17 9	0 18 48	0 20 42	0 22 42	0 21 56	0 27 20	0 30 0	0 32 44
5	0 11 4	0 11 22	0 11 50	0 12 33	0 13 30	0 14 37	0 16 0	0 17 30	0 19 18	0 21 14	0 23 23	0 25 41	0 28 16	0 31 2	0 33 55
6	0 11 5	0 11 23	0 11 55	0 12 40	0 13 40	0 14 51	0 16 18	0 17 54	0 19 48	0 21 50	0 24 8	0 26 34	0 29 18	0 32 12	0 35 16
7	0 11 6	0 11 24	0 12 1	0 12 48	0 13 51	0 15 6	0 16 38	0 18 21	0 20 21	0 22 31	0 24 58	0 27 32	0 30 26	0 33 30	0 36 47
8	0 11 7	0 11 26	0 12 7	0 12 56	0 14 4	0 15 21	0 17 0	0 18 53	0 20 59	0 23 17	0 25 54	0 28 38	0 31 41	0 34 56	0 38 29
9	0 11 9	0 11 30	0 12 13	0 13 6	0 14 19	0 15 43	0 17 26	0 19 28	0 21 44	0 24 13	0 26 50	0 29 48	0 33 3	0 36 34	0 40 20
10	0 11 11	0 11 35	0 12 19	0 13 19	0 14 37	0 16 12	0 17 59	0 20 10	0 22 36	0 25 16	0 28 14	0 31 26	0 34 54	0 38 42	0 42 41
11	0 11 13	0 11 39	0 12 27	0 13 32	0 14 57	0 16 41	0 18 39	0 20 59	0 23 38	0 26 33	0 29 46	0 33 15	0 37 3	0 41 8	0 45 26
12	0 11 15	0 11 44	0 12 36	0 13 46	0 15 20	0 17 13	0 19 23	0 21 53	0 24 46	0 27 56	0 31 25	0 35 12	0 39 21	0 43 44	0 48 22
13	0 11 17	0 11 49	0 12 46	0 14 4	0 15 48	0 17 52	0 20 19	0 23 5	0 26 16	0 29 47	0 33 37	0 37 50	0 42 25	0 47 14	0 52 23
14	0 11 20	0 11 54	0 12 57	0 14 27	0 16 23	0 18 39	0 21 23	0 24 27	0 27 56	0 31 48	0 36 0	0 40 39	0 45 41	0 50 56	0 56 36
15	0 11 23	0 12 2	0 13 15	0 14 57	0 17 9	0 19 47	0 22 56	0 26 27	0 30 25	0 34 52	0 39 41	0 44 54	0 50 34	0 56 29	1 2 50
16	0 11 26	0 12 14	0 13 39	0 15 33	0 18 1	0 21 1	0 24 35	0 28 33	0 33 1	0 38 3	0 43 30	0 49 18	0 55 37	1 2 12	1 9 14
17	0 11 29	0 12 28	0 14 9	0 16 32	0 19 35	0 23 16	0 27 32	0 32 21	0 37 48	0 43 44	0 50 8	0 56 56	1 4 12	1 11 53	1 19 57
18	0 11 33	0 12 45	0 14 47	0 17 40	0 21 18	0 25 40	0 30 38	0 36 18	0 42 45	0 49 36	0 56 57	1 4 45	1 12 58	1 21 46	1 30 53
19	0 11 39	0 13 18	0 15 55	0 19 42	0 24 22	0 29 52	0 36 14	0 43 18	0 51 44	0 59 33	1 8 25	1 17 43	1 27 41	1 37 48	1 48 22
20	0 11 47	0 14 22	0 18 22	0 23 37	0 29 54	0 37 42	0 46 3	0 55 22	1 5 13	1 15 34	1 26 26	1 37 40	1 49 13	2 1 2	2 12 57
21	0 12 50	0 17 29	0 24 14	0 32 50	0 43 29	0 54 14	1 5 54	1 17 43	1 30 33	1 43 4	1 55 55	2 9 4	2 22 20	2 35 35	2 48 51
22	Not calculable.														
23	0 12 50	0 17 29	0 23 54	0 32 45	0 42 50	0 53 45	1 5 14	1 16 55	1 29 43	1 42 23	1 54 55	2 7 59	2 20 54	2 34 17	2 47 38

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 56	0 11 11	0 11 34	0 12 9	0 12 52	0 13 45	0 14 49	0 16 1	0 17 23	0 18 56	0 20 36	0 22 28	0 24 28	0 26 38	0 28 57
1	0 10 54	0 11 9	0 11 31	0 12 4	0 12 46	0 13 37	0 14 39	0 15 48	0 17 7	0 18 35	0 20 10	0 21 58	0 23 54	0 25 58	0 28 12
2	0 10 53	0 11 7	0 11 28	0 12 0	0 12 40	0 13 29	0 14 29	0 15 36	0 16 51	0 18 15	0 19 47	0 21 30	0 23 22	0 25 21	0 27 29
3	0 10 52	0 11 5	0 11 25	0 11 56	0 12 34	0 13 22	0 14 19	0 15 24	0 16 36	0 17 57	0 19 26	0 21 4	0 22 52	0 24 47	0 26 49
4	0 10 51	0 11 3	0 11 22	0 11 52	0 12 28	0 13 15	0 14 10	0 15 12	0 16 22	0 17 40	0 19 6	0 20 40	0 22 24	0 24 15	0 26 12
5	0 10 50	0 11 1	0 11 20	0 11 48	0 12 23	0 13 8	0 14 1	0 15 0	0 16 9	0 17 23	0 18 47	0 20 18	0 21 58	0 23 45	0 25 38
6	0 10 49	0 10 59	0 11 17	0 11 44	0 12 19	0 13 2	0 13 53	0 14 49	0 15 56	0 17 8	0 18 29	0 19 57	0 21 34	0 23 18	0 25 7
7	0 10 47	0 10 57	0 11 14	0 11 40	0 12 15	0 12 56	0 13 45	0 14 39	0 15 44	0 16 54	0 18 12	0 19 37	0 21 11	0 22 52	0 24 38
8	0 10 45	0 10 55	0 11 12	0 11 37	0 12 11	0 12 50	0 13 37	0 14 30	0 15 33	0 16 41	0 17 56	0 19 18	0 20 49	0 22 27	0 24 10
9	0 10 43	0 10 53	0 11 10	0 11 34	0 12 7	0 12 45	0 13 30	0 14 21	0 15 22	0 16 28	0 17 41	0 19 1	0 20 28	0 22 3	0 23 43
10	0 10 41	0 10 52	0 11 8	0 11 31	0 12 3	0 12 40	0 13 23	0 14 13	0 15 12	0 16 15	0 17 26	0 18 44	0 20 8	0 21 40	0 23 17
11	0 10 40	0 10 50	0 11 6	0 11 28	0 11 59	0 12 35	0 13 17	0 14 6	0 15 2	0 16 3	0 17 12	0 18 28	0 19 49	0 21 18	0 22 52
12	0 10 39	0 10 48	0 11 4	0 11 25	0 11 55	0 12 30	0 13 11	0 13 59	0 14 53	0 15 52	0 16 59	0 18 13	0 19 31	0 20 57	0 22 28
13	0 10 37	0 10 46	0 11 2	0 11 22	0 11 51	0 12 25	0 13 5	0 13 52	0 14 44	0 15 41	0 16 46	0 17 59	0 19 14	0 20 37	0 22 5
14	0 10 35	0 10 44	0 11 0	0 11 19	0 11 47	0 12 20	0 12 59	0 13 45	0 14 36	0 15 31	0 16 34	0 17 45	0 18 58	0 20 18	0 21 43
15	0 10 33	0 10 42	0 10 58	0 11 16	0 11 43	0 12 15	0 12 53	0 13 38	0 14 28	0 15 21	0 16 22	0 17 31	0 18 43	0 20 0	0 21 23
16	0 10 31	0 10 40	0 10 56	0 11 13	0 11 39	0 12 10	0 12 47	0 13 31	0 14 20	0 15 12	0 16 11	0 17 18	0 18 28	0 19 43	0 21 4
17	0 10 29	0 10 38	0 10 53	0 11 10	0 11 35	0 12 5	0 12 41	0 13 24	0 14 12	0 15 3	0 16 0	0 17 5	0 18 13	0 19 27	0 20 46
18	0 10 27	0 10 36	0 10 50	0 11 7	0 11 31	0 12 0	0 12 36	0 13 17	0 14 4	0 14 54	0 15 50	0 16 53	0 17 59	0 19 11	0 20 28
19	0 10 25	0 10 34	0 10 47	0 11 4	0 11 28	0 11 56	0 12 31	0 13 10	0 13 56	0 14 45	0 15 40	0 16 41	0 17 45	0 18 56	0 20 11
20	0 10 23	0 10 31	0 10 44	0 11 1	0 11 25	0 11 52	0 12 26	0 13 4	0 13 48	0 14 36	0 15 30	0 16 29	0 17 32	0 18 41	0 19 54
21	0 10 21	0 10 29	0 10 41	0 10 58	0 11 21	0 11 47	0 12 20	0 12 57	0 13 40	0 14 27	0 15 20	0 16 17	0 17 19	0 18 26	0 19 38
22	0 10 19	0 10 27	0 10 38	0 10 55	0 11 17	0 11 43	0 12 14	0 12 51	0 13 33	0 14 18	0 15 10	0 16 5	0 17 6	0 18 12	0 19 22
23	0 10 17	0 10 24	0 10 35	0 10 51	0 11 12	0 11 39	0 12 9	0 12 45	0 13 26	0 14 10	0 15 0	0 15 54	0 16 53	0 17 58	0 19 6

LATITUDE 22° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 31 24	0 34 4	0 36 50	0 39 46	0 42 52	0 46 6	0 49 29	0 53 1	0 56 42	1 0 32	1 4 31	1 8 38	1 12 53	1 17 18	1 21 50
1	0 32 19	0 35 7	0 38 1	0 41 3	0 44 17	0 47 39	0 51 12	0 54 53	0 58 44	1 2 44	1 6 53	1 11 10	1 15 37	1 20 12	1 24 55
2	0 33 20	0 36 16	0 39 18	0 42 28	0 45 50	0 49 21	0 53 4	0 56 55	1 0 56	1 5 7	1 9 25	1 13 53	1 18 32	1 23 19	1 28 13
3	0 34 27	0 37 31	0 40 42	0 44 1	0 47 33	0 51 13	0 55 6	0 59 7	1 3 18	1 7 41	1 12 9	1 16 49	1 21 41	1 26 42	1 31 47
4	0 35 42	0 38 53	0 42 14	0 45 44	0 49 26	0 53 17	0 57 20	1 1 34	1 5 56	1 10 30	1 15 12	1 20 4	1 25 9	1 30 23	1 35 44
5	0 37 4	0 40 23	0 43 54	0 47 37	0 51 29	0 55 35	0 59 48	1 4 16	1 8 51	1 13 37	1 18 35	1 23 41	1 29 0	1 34 27	1 40 4
6	0 38 35	0 42 5	0 45 47	0 49 42	0 53 48	0 58 9	1 2 34	1 7 16	1 12 7	1 17 9	1 22 20	1 27 43	1 33 19	1 38 57	1 44 51
7	0 40 16	0 44 1	0 47 54	0 52 2	0 56 23	1 0 59	1 5 38	1 10 36	1 15 43	1 21 2	1 26 29	1 32 10	1 38 4	1 43 59	1 50 11
8	0 42 9	0 46 11	0 50 16	0 54 37	0 59 15	1 4 5	1 9 2	1 14 19	1 19 42	1 25 19	1 31 5	1 37 6	1 43 19	1 49 37	1 56 9
9	0 44 16	0 48 34	0 52 59	0 57 37	1 2 33	1 7 41	1 12 53	1 18 29	1 24 13	1 30 10	1 36 21	1 42 42	1 49 15	1 55 58	2 2 55
10	0 46 54	0 51 28	0 56 13	1 1 9	1 6 24	1 11 51	1 17 30	1 23 25	1 29 31	1 35 48	1 42 24	1 49 6	1 56 0	2 3 8	2 10 30
11	0 50 1	0 54 58	1 0 4	1 5 25	1 11 3	1 16 56	1 23 1	1 29 22	1 35 55	1 42 40	1 49 42	1 56 52	2 4 13	2 11 48	2 19 38
12	0 53 20	0 58 40	1 4 7	1 9 53	1 15 54	1 22 14	1 28 45	1 35 33	1 42 33	1 49 46	1 57 14	2 4 53	2 12 41	2 20 44	2 29 2
13	0 57 50	1 3 40	1 9 37	1 15 56	1 22 30	1 29 22	1 36 12	1 43 48	1 51 23	1 59 11	2 7 13	2 15 25	2 23 49	2 32 27	2 41 19
14	1 2 32	1 8 53	1 15 20	1 22 13	1 29 20	1 36 44	1 44 24	1 52 19	2 0 29	2 8 53	2 17 30	2 26 16	2 35 16	2 44 30	2 53 56
15	1 9 29	1 16 34	1 23 48	1 31 22	1 39 13	1 47 23	1 55 34	2 4 26	2 13 20	2 22 27	2 31 47	2 41 17	2 50 58	3 0 52	3 10 59
16	1 16 36	1 24 25	1 32 27	1 40 42	1 49 18	1 58 14	2 7 27	2 16 47	2 26 26	2 36 16	2 46 19	2 56 33	3 6 55	3 17 30	3 28 18
17	1 28 24	1 37 13	1 46 19	1 55 37	2 5 12	2 15 4	2 25 15	2 35 32	2 46 0	2 56 41	3 7 32	3 18 36	3 29 45	3 41 4	3 52 37
18	1 40 26	1 50 15	2 0 26	2 10 47	2 21 22	2 32 11	2 43 20	2 54 34	3 5 51	3 17 24	3 29 4	3 40 58	3 52 55	4 4 59	4 17 18
19	1 59 5	2 10 10	2 21 39	2 33 4	2 44 50	2 56 45	3 8 59	3 20 57	3 33 21	3 46 0	3 58 21	4 11 0	4 23 41	4 36 31	4 49 23
20	2 25 20	2 37 44	2 50 20	3 3 4	3 15 48	3 28 46	3 41 46	3 54 51	4 8 3	4 21 14	4 34 30	4 47 49	5 1 13	5 14 36	5 28 0
21	3 2 20	3 15 46	3 29 27	3 43 2	3 56 43	4 10 21	4 23 56	4 37 49	4 51 32	5 5 12	5 18 59	5 32 46	5 46 31	6 0 17	6 14 1
22	Not calculable.														
23	3 0 57	3 14 16	3 27 45	3 41 14	3 54 46	4 8 19	4 21 56	4 35 36	4 49 8	5 2 47	5 16 27	5 30 2	5 43 49	5 57 31	6 11 13

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 31 24	0 34 4	0 36 50	0 39 46	0 42 52	0 46 6	0 49 29	0 53 1	0 56 42	1 0 32	1 4 31	1 8 38	1 12 53	1 17 18	1 21 50
1	0 30 34	0 33 6	0 35 46	0 38 34	0 41 34	0 44 41	0 47 57	0 51 17	0 54 50	0 58 31	1 2 22	1 6 20	1 10 26	1 14 36	1 19 2
2	0 29 47	0 32 13	0 34 47	0 37 28	0 40 22	0 43 22	0 46 30	0 49 41	0 53 6	0 56 39	1 0 22	1 4 11	1 8 9	1 12 7	1 16 25
3	0 29 3	0 31 23	0 33 52	0 36 27	0 39 14	0 42 8	0 45 8	0 48 13	0 51 31	0 54 56	0 58 31	1 2 11	1 6 1	1 9 50	1 13 59
4	0 28 21	0 30 36	0 33 0	0 35 30	0 38 10	0 40 58	0 43 51	0 46 51	0 50 2	0 53 20	0 56 47	1 0 19	1 4 1	1 7 44	1 11 43
5	0 27 41	0 29 52	0 32 11	0 34 36	0 37 10	0 39 52	0 42 39	0 45 35	0 48 39	0 51 50	0 55 10	0 58 34	1 2 8	1 5 48	1 9 36
6	0 27 4	0 29 11	0 31 25	0 33 45	0 36 13	0 38 50	0 41 32	0 44 24	0 47 22	0 50 26	0 53 39	0 56 56	1 0 23	1 4 0	1 7 37
7	0 26 30	0 28 33	0 30 42	0 32 57	0 35 20	0 37 52	0 40 29	0 43 17	0 46 9	0 49 7	0 52 14	0 55 24	0 58 45	1 2 18	1 5 46
8	0 25 58	0 27 57	0 30 2	0 32 12	0 34 31	0 36 58	0 39 30	0 42 13	0 45 0	0 47 52	0 50 53	0 53 58	0 57 12	1 0 41	1 4 1
9	0 25 28	0 27 24	0 29 25	0 31 31	0 33 46	0 36 8	0 38 35	0 41 12	0 43 54	0 46 40	0 49 36	0 52 36	0 55 44	0 59 8	1 2 21
10	0 25 0	0 26 53	0 28 50	0 30 53	0 33 4	0 35 21	0 37 44	0 40 14	0 42 51	0 45 32	0 48 23	0 51 18	0 54 20	0 57 39	1 0 46
11	0 24 34	0 26 24	0 28 17	0 30 17	0 32 24	0 34 37	0 36 56	0 39 19	0 41 52	0 44 27	0 47 13	0 50 3	0 53 0	0 56 13	0 59 17
12	0 24 9	0 25 56	0 27 46	0 29 43	0 31 46	0 33 55	0 36 10	0 38 27	0 40 56	0 43 26	0 46 7	0 48 53	0 51 44	0 54 51	0 57 51
13	0 23 45	0 25 29	0 27 16	0 29 10	0 31 10	0 33 15	0 35 26	0 37 38	0 40 3	0 42 28	0 45 5	0 47 46	0 50 33	0 53 33	0 56 29
14	0 23 21	0 25 3	0 26 47	0 28 38	0 30 35	0 32 37	0 34 44	0 36 51	0 39 12	0 41 33	0 44 6	0 46 43	0 49 26	0 52 19	0 55 11
15	0 22 58	0 24 37	0 26 19	0 28 6	0 30 0	0 31 59	0 34 3	0 36 6	0 38 23	0 40 41	0 43 10	0 45 43	0 48 22	0 51 8	0 53 56
16	0 22 35	0 24 12	0 25 51	0 27 35	0 29 26	0 31 22	0 33 23	0 35 23	0 37 36	0 39 51	0 42 16	0 44 45	0 47 20	0 50 0	0 52 44
17	0 22 13	0 23 47	0 25 24	0 27 5	0 28 53	0 30 46	0 32 44	0 34 42	0 36 51	0 39 3	0 41 24	0 43 49	0 46 20	0 48 55	0 51 35
18	0 21 52	0 23 23	0 24 57	0 26 36	0 28 21	0 30 11	0 32 6	0 34 2	0 36 8	0 38 17	0 40 34	0 42 55	0 45 22	0 47 53	0 50 29
19	0 21 32	0 23 0	0 24 31	0 26 8	0 27 50	0 29 37	0 31 29	0 33 24	0 35 27	0 37 33	0 39 46	0 42 3	0 44 26	0 46 54	0 49 26
20	0 21 13	0 22 38	0 24 6	0 25 41	0 27 20	0 29 4	0 30 53	0 32 47	0 34 47	0 36 50	0 38 59	0 41 13	0 43 32	0 45 57	0 48 21
21	0 20 55	0 22 17	0 23 43	0 25 15	0 26 51	0 28 32	0 30 19	0 32 12	0 34 8	0 36 8	0 38 14	0 40 25	0 42 40	0 45 2	0 47 26
22	0 20 37	0 21 57	0 23 21	0 24 50	0 26 24	0 28 20	0 29 47	0 31 37	0 33 30	0 35 27	0 37 30	0 39 38	0 41 50	0 44 8	0 46 29
23	0 20 20	0 21 37	0 23 0	0 24 27	0 25 59	0 27 35	0 29 18	0 31 3	0 32 53	0 34 48	0 36 48	0 38 52	0 41 1	0 43 15	0 45 32

LATITUDE 22° NORTH OR SOUTH.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 26 31	1 31 20	1 36 17	1 41 22	1 46 35	1 51 56	1 57 24	2 3 2	2 8 47	2 14 38	2 20 37	2 26 43	2 32 56	2 39 17	2 45 45
1	1 23 32	1 28 11	1 32 57	1 37 51	1 42 53	1 48 3	1 53 20	1 58 47	2 4 21	2 10 1	2 15 46	2 21 39	2 27 38	2 33 44	2 39 59
2	1 20 45	1 25 14	1 29 50	1 34 34	1 39 25	1 44 25	1 49 32	1 54 48	2 0 11	2 5 39	2 11 12	2 16 53	2 22 39	2 28 30	2 34 33
3	1 18 9	1 22 29	1 26 56	1 31 30	1 36 11	1 41 1	1 45 58	1 51 3	1 56 15	2 1 32	2 6 54	2 12 24	2 17 59	2 23 40	2 29 31
4	1 15 44	1 19 55	1 24 13	1 28 38	1 33 10	1 37 50	1 42 37	1 47 31	1 52 32	1 57 39	2 2 51	2 8 11	2 13 36	2 19 8	2 24 48
5	1 13 29	1 17 31	1 21 41	1 25 57	1 30 21	1 34 51	1 39 28	1 44 12	1 49 2	1 53 59	1 59 3	2 4 13	2 9 29	2 14 51	2 20 21
6	1 11 23	1 15 17	1 19 19	1 23 27	1 27 42	1 32 3	1 36 31	1 41 7	1 45 48	1 50 35	1 55 30	2 0 30	2 5 37	2 10 50	2 16 9
7	1 9 25	1 13 11	1 17 5	1 21 6	1 25 13	1 29 26	1 33 45	1 38 16	1 42 46	1 47 24	1 52 10	1 57 1	2 2 0	2 7 4	2 12 12
8	1 7 33	1 11 12	1 14 59	1 18 52	1 22 52	1 26 58	1 31 9	1 35 32	1 39 54	1 44 24	1 49 2	1 53 44	1 58 34	2 3 29	2 8 28
9	1 5 47	1 9 19	1 12 59	1 16 45	1 20 38	1 24 37	1 28 41	1 32 56	1 37 10	1 41 33	1 46 3	1 50 37	1 55 18	2 0 5	2 4 56
10	1 4 6	1 7 32	1 11 5	1 14 44	1 18 30	1 22 22	1 26 20	1 30 24	1 34 34	1 38 50	1 43 12	1 47 39	1 52 12	1 56 51	2 1 35
11	1 2 31	1 5 51	1 9 17	1 12 49	1 16 29	1 20 15	1 24 6	1 28 3	1 32 6	1 36 15	1 40 29	1 44 49	1 49 15	1 53 46	1 58 24
12	1 1 0	1 4 14	1 7 35	1 11 1	1 14 35	1 18 15	1 21 59	1 25 49	1 29 45	1 33 47	1 37 54	1 42 7	1 46 27	1 50 51	1 55 22
13	0 59 33	1 2 42	1 5 58	1 9 18	1 12 46	1 16 20	1 19 58	1 23 41	1 27 31	1 31 26	1 35 27	1 39 33	1 43 47	1 48 4	1 52 27
14	0 58 10	1 1 14	1 4 25	1 7 40	1 11 2	1 14 30	1 18 2	1 21 39	1 25 23	1 29 12	1 33 7	1 37 7	1 41 14	1 45 24	1 49 40
15	0 56 50	0 59 49	1 2 55	1 6 6	1 9 23	1 12 45	1 16 12	1 19 43	1 23 21	1 27 5	1 30 54	1 34 48	1 38 47	1 42 50	1 46 59
16	0 55 34	0 58 28	1 1 29	1 4 35	1 7 47	1 11 3	1 14 25	1 17 50	1 21 23	1 25 2	1 28 46	1 32 34	1 36 26	1 40 23	1 44 25
17	0 54 21	0 57 11	1 0 7	1 3 8	1 6 15	1 9 26	1 12 43	1 16 3	1 19 31	1 23 4	1 26 42	1 30 25	1 34 11	1 38 2	1 41 58
18	0 53 11	0 55 57	0 58 48	1 1 44	1 4 47	1 7 53	1 11 5	1 14 21	1 17 44	1 21 11	1 24 43	1 28 21	1 32 1	1 35 47	1 39 37
19	0 52 4	0 54 46	0 57 33	1 0 24	1 3 23	1 6 24	1 9 31	1 12 43	1 16 1	1 19 23	1 22 49	1 26 21	1 29 56	1 33 37	1 37 22
20	0 50 59	0 53 37	0 56 20	0 59 7	1 2 0	1 4 58	1 8 1	1 11 8	1 14 21	1 17 38	1 20 59	1 24 25	1 27 56	1 31 32	1 35 12
21	0 49 56	0 52 30	0 55 9	0 57 52	1 0 41	1 3 35	1 6 34	1 9 36	1 12 44	1 15 56	1 19 12	1 22 33	1 26 0	1 29 31	1 33 6
22	0 48 55	0 51 25	0 54 0	0 56 40	0 59 25	1 2 15	1 5 9	1 8 7	1 11 10	1 14 17	1 17 28	1 20 44	1 24 7	1 27 34	1 31 4
23	0 47 55	0 50 22	0 52 54	0 55 30	0 58 11	1 0 57	1 3 47	1 6 41	1 9 39	1 12 42	1 15 48	1 18 59	1 22 16	1 25 39	1 29 5

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	2 52 20	2 59 1	3 5 51	3 12 45	3 19 46	3 26 55	3 34 0	3 41 31	3 48 45	3 56 32	4 4 11	4 11 57	4 19 47	4 27 44	4 35 47
1	2 46 22	2 52 51	2 59 27	3 6 8	3 12 55	3 19 51	3 26 47	3 34 0	3 41 5	3 48 33	3 55 57	4 3 27	4 11 6	4 18 47	4 26 38
2	2 40 44	2 47 1	2 53 24	2 59 52	3 6 26	3 13 9	3 19 55	3 26 51	3 33 48	3 40 58	3 48 7	3 55 21	4 2 49	4 10 15	4 17 55
3	2 35 30	2 41 35	2 47 46	2 54 2	3 0 25	3 6 55	3 13 30	3 20 12	3 26 57	3 33 52	3 40 50	3 47 54	3 55 8	4 2 23	4 9 48
4	2 30 35	2 36 28	2 42 27	2 48 32	2 54 44	3 1 2	3 7 26	3 13 55	3 20 28	3 27 8	3 33 56	3 40 50	3 47 50	3 54 55	4 2 5
5	2 25 58	2 31 41	2 37 29	2 43 23	2 49 23	2 55 30	3 1 43	3 8 2	3 14 25	3 20 55	3 27 31	3 34 11	3 40 55	3 47 47	3 54 46
6	2 21 37	2 27 9	2 32 47	2 38 31	2 44 21	2 50 17	2 56 19	3 2 27	3 8 39	3 14 59	3 21 22	3 27 54	3 34 27	3 41 6	3 47 56
7	2 17 31	2 22 53	2 28 21	2 33 56	2 39 36	2 45 22	2 51 14	2 57 11	3 3 13	3 9 23	3 15 34	3 21 59	3 28 21	3 34 48	3 41 29
8	2 13 37	2 18 49	2 24 9	2 29 35	2 35 6	2 40 42	2 46 24	2 52 11	2 58 3	3 4 2	3 10 4	3 16 18	3 22 31	3 28 47	3 35 16
9	2 9 55	2 14 59	2 20 10	2 25 27	2 30 49	2 36 16	2 41 49	2 47 27	2 53 9	2 58 58	3 4 52	3 10 55	3 17 0	3 23 9	3 29 22
10	2 6 25	2 11 21	2 16 24	2 21 32	2 26 45	2 32 4	2 37 28	2 42 57	2 48 30	2 54 9	2 59 55	3 5 48	3 11 45	3 17 44	3 23 46
11	2 3 6	2 7 55	2 12 49	2 17 48	2 22 52	2 28 2	2 33 17	2 38 39	2 44 5	2 49 35	2 55 11	3 0 55	3 6 43	3 12 33	3 18 26
12	1 59 58	2 4 39	2 9 24	2 14 14	2 19 10	2 24 11	2 29 17	2 34 31	2 39 51	2 45 14	2 50 40	2 56 14	3 1 53	3 7 34	3 13 19
13	1 56 57	2 1 31	2 6 9	2 10 50	2 15 39	2 20 32	2 25 29	2 30 35	2 35 47	2 41 2	2 46 20	2 51 45	2 57 16	3 2 48	3 8 26
14	1 54 2	1 58 29	2 3 1	2 7 35	2 12 17	2 17 3	2 21 53	2 26 50	2 31 54	2 37 1	2 42 11	2 47 28	2 52 52	2 58 17	3 3 47
15	1 51 14	1 55 34	2 0 0	2 4 30	2 9 4	2 13 43	2 18 26	2 23 16	2 28 12	2 33 11	2 38 13	2 43 23	2 48 40	2 53 59	2 59 20
16	1 48 34	1 52 48	1 57 7	2 1 31	2 5 58	2 10 29	2 15 6	2 19 50	2 24 38	2 29 31	2 34 26	2 39 28	2 44 36	2 49 47	2 55 1
17	1 46 1	1 50 9	1 54 22	1 58 39	2 2 59	2 7 24	2 11 35	2 16 33	2 21 14	2 25 59	2 30 47	2 35 41	2 40 41	2 45 45	2 50 52
18	1 43 34	1 47 36	1 51 43	1 55 54	2 0 8	2 4 27	2 8 51	2 13 22	2 17 56	2 22 34	2 27 16	2 32 2	2 36 55	2 41 52	2 46 52
19	1 41 13	1 45 9	1 49 10	1 53 15	1 57 23	2 1 36	2 5 53	2 10 17	2 14 44	2 19 15	2 23 51	2 28 31	2 33 17	2 38 7	2 43 0
20	1 38 56	1 42 46	1 46 42	1 50 41	1 54 43	1 58 50	2 3 1	2 7 18	2 11 38	2 16 3	2 20 33	2 25 7	2 29 46	2 34 29	2 39 16
21	1 36 45	1 40 29	1 44 19	1 48 12	1 52 8	1 56 9	2 0 15	2 4 26	2 8 40	2 12 59	2 17 22	2 21 50	2 26 22	2 30 59	2 35 40
22	1 34 37	1 38 16	1 42 1	1 45 48	1 49 38	1 53 34	1 57 35	2 1 40	2 5 48	2 10 1	2 14 18	2 18 40	2 23 6	2 27 37	2 32 12
23	1 32 33	1 36 7	1 39 46	1 43 27	1 47 13	1 51 3	1 54 59	1 58 59	2 3 2	2 7 9	2 11 20	2 15 36	2 19 56	2 24 21	2 28 51

LATITUDE 23° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 54	0 11 9	0 11 31	0 12 3	0 12 46	0 13 37	0 14 37	0 15 46	0 17 4	0 18 32	0 20 8	0 21 54	0 23 48	0 25 52	0 28 4
1	0 10 55	0 11 10	0 11 33	0 12 7	0 12 52	0 13 45	0 14 48	0 15 59	0 17 22	0 18 53	0 20 33	0 22 23	0 24 21	0 26 30	0 28 48
2	0 10 57	0 11 12	0 11 36	0 12 11	0 12 59	0 13 53	0 14 59	0 16 13	0 17 40	0 19 15	0 20 59	0 22 54	0 24 58	0 27 12	0 29 36
3	0 10 59	0 11 14	0 11 39	0 12 16	0 13 6	0 14 2	0 15 11	0 16 28	0 17 59	0 19 38	0 21 27	0 23 27	0 25 39	0 27 59	0 30 30
4	0 11 0	0 11 16	0 11 42	0 12 21	0 13 14	0 14 13	0 15 24	0 16 46	0 18 20	0 20 5	0 21 59	0 24 4	0 26 24	0 28 50	0 31 28
5	0 11 2	0 11 19	0 11 46	0 12 27	0 13 22	0 14 25	0 15 38	0 17 7	0 18 44	0 20 35	0 22 36	0 24 47	0 27 14	0 29 47	0 32 33
6	0 11 3	0 11 21	0 11 50	0 12 33	0 13 31	0 14 39	0 15 54	0 17 28	0 19 12	0 21 8	0 23 16	0 25 37	0 28 9	0 30 51	0 33 47
7	0 11 4	0 11 23	0 11 55	0 12 40	0 13 40	0 14 53	0 16 13	0 17 52	0 19 43	0 21 45	0 24 0	0 26 33	0 29 9	0 32 1	0 35 10
8	0 11 6	0 11 26	0 12 1	0 12 47	0 13 50	0 15 8	0 16 34	0 18 18	0 20 18	0 22 26	0 24 48	0 27 26	0 30 16	0 33 18	0 36 43
9	0 11 8	0 11 29	0 12 7	0 12 57	0 14 3	0 15 25	0 16 59	0 18 49	0 20 56	0 23 12	0 25 43	0 28 31	0 31 35	0 34 49	0 38 21
10	0 11 10	0 11 33	0 12 13	0 13 8	0 14 19	0 15 46	0 17 28	0 19 25	0 21 39	0 24 7	0 26 48	0 29 46	0 33 4	0 36 30	0 40 10
11	0 11 12	0 11 36	0 12 20	0 13 19	0 14 35	0 16 10	0 18 0	0 20 5	0 22 31	0 25 7	0 28 2	0 31 13	0 34 45	0 38 27	0 42 24
12	0 11 14	0 11 40	0 12 27	0 13 30	0 14 52	0 16 36	0 18 35	0 20 49	0 23 27	0 26 20	0 29 30	0 32 54	0 36 41	0 40 40	0 44 55
13	0 11 15	0 11 44	0 12 35	0 13 43	0 15 15	0 17 7	0 19 19	0 21 47	0 24 40	0 27 45	0 31 11	0 34 55	0 39 2	0 43 25	0 48 4
14	0 11 17	0 11 48	0 12 44	0 13 59	0 15 44	0 17 44	0 20 10	0 22 52	0 26 0	0 29 32	0 33 15	0 37 20	0 41 47	0 46 35	0 51 38
15	0 11 19	0 11 53	0 12 58	0 14 22	0 16 18	0 18 38	0 21 19	0 24 22	0 27 56	0 31 42	0 35 52	0 40 28	0 45 27	0 50 47	0 56 25
16	0 11 21	0 11 59	0 13 16	0 14 50	0 16 58	0 19 38	0 22 35	0 25 59	0 29 59	0 34 16	0 38 53	0 44 1	0 49 32	0 55 24	1 1 37
17	0 11 24	0 12 10	0 13 36	0 15 35	0 18 4	0 21 8	0 24 37	0 28 41	0 33 17	0 37 40	0 43 4	0 48 58	0 55 18	1 1 58	1 8 59
18	0 11 28	0 12 25	0 13 59	0 16 23	0 19 14	0 22 43	0 26 45	0 31 30	0 36 43	0 42 23	0 48 34	0 55 14	1 2 23	1 9 52	1 17 41
19	0 11 38	0 12 45	0 14 43	0 17 33	0 21 16	0 25 30	0 30 24	0 35 55	0 42 27	0 49 4	0 56 24	1 4 9	1 12 29	1 21 0	1 30 1
20	0 11 44	0 13 22	0 15 49	0 19 33	0 24 18	0 29 42	0 35 52	0 42 53	0 54 44	0 58 55	1 7 44	1 16 53	1 26 43	1 36 44	1 47 12
21	0 12 13	0 14 27	0 18 13	0 23 22	0 29 47	0 37 16	0 45 42	0 54 44	1 4 42	1 14 47	1 25 40	1 36 45	1 48 19	1 59 59	2 11 47
22	0 12 50	0 17 29	0 23 54	0 32 45	0 42 50	0 53 45	1 5 14	1 16 55	1 29 43	1 42 23	1 54 55	2 7 59	2 20 54	2 34 17	2 47 38
23	Not	calcula	ble.												

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 54	0 11 9	0 11 31	0 12 3	0 12 46	0 13 37	0 14 37	0 15 46	0 17 4	0 18 32	0 20 8	0 21 54	0 23 48	0 25 52	0 28 4
1	0 10 52	0 11 6	0 11 28	0 11 59	0 12 40	0 13 29	0 14 27	0 15 34	0 16 48	0 18 13	0 19 44	0 21 26	0 23 17	0 25 16	0 27 22
2	0 10 50	0 11 4	0 11 25	0 11 55	0 12 34	0 13 21	0 14 17	0 15 22	0 16 33	0 17 55	0 19 22	0 21 0	0 22 47	0 24 42	0 26 44
3	0 10 49	0 11 2	0 11 22	0 11 51	0 12 29	0 13 14	0 14 8	0 15 10	0 16 19	0 17 38	0 19 2	0 20 36	0 22 19	0 24 10	0 26 8
4	0 10 48	0 11 0	0 11 19	0 11 47	0 12 24	0 13 7	0 13 59	0 14 59	0 16 6	0 17 21	0 18 43	0 20 14	0 21 53	0 23 40	0 25 34
5	0 10 47	0 10 58	0 11 17	0 11 44	0 12 19	0 13 0	0 13 50	0 14 48	0 15 53	0 17 5	0 18 25	0 19 53	0 21 29	0 23 12	0 25 2
6	0 10 46	0 10 56	0 11 14	0 11 40	0 12 14	0 12 54	0 13 43	0 14 39	0 15 41	0 16 51	0 18 8	0 19 33	0 21 6	0 22 46	0 24 32
7	0 10 45	0 10 54	0 11 11	0 11 36	0 12 9	0 12 48	0 13 35	0 14 30	0 15 30	0 16 38	0 17 52	0 19 14	0 20 44	0 22 21	0 24 4
8	0 10 43	0 10 52	0 11 9	0 11 33	0 12 5	0 12 43	0 13 28	0 14 22	0 15 19	0 16 25	0 17 37	0 18 56	0 20 24	0 21 57	0 23 37
9	0 10 41	0 10 50	0 11 7	0 11 30	0 12 1	0 12 38	0 13 21	0 14 14	0 15 9	0 16 13	0 17 23	0 18 39	0 20 5	0 21 35	0 23 12
10	0 10 39	0 10 49	0 11 5	0 11 27	0 11 57	0 12 33	0 13 15	0 14 6	0 15 0	0 16 2	0 17 10	0 18 24	0 19 48	0 21 15	0 22 49
11	0 10 38	0 10 47	0 11 3	0 11 25	0 11 53	0 12 28	0 13 9	0 13 59	0 14 51	0 15 51	0 16 57	0 18 9	0 19 31	0 20 56	0 22 27
12	0 10 36	0 10 45	0 11 1	0 11 22	0 11 49	0 12 23	0 13 3	0 13 52	0 14 42	0 15 41	0 16 45	0 17 55	0 19 15	0 20 38	0 22 6
13	0 10 35	0 10 43	0 10 59	0 11 19	0 11 45	0 12 18	0 12 57	0 13 45	0 14 34	0 15 31	0 16 33	0 17 41	0 18 59	0 20 20	0 21 46
14	0 10 33	0 10 41	0 10 57	0 11 16	0 11 41	0 12 13	0 12 51	0 13 38	0 14 26	0 15 22	0 16 22	0 17 28	0 18 43	0 20 2	0 21 26
15	0 10 31	0 10 39	0 10 55	0 11 13	0 11 37	0 12 8	0 12 46	0 13 31	0 14 18	0 15 13	0 16 11	0 17 15	0 18 28	0 19 45	0 21 7
16	0 10 29	0 10 37	0 10 53	0 11 10	0 11 33	0 12 4	0 12 41	0 13 24	0 14 10	0 15 4	0 16 0	0 17 2	0 18 13	0 19 28	0 20 48
17	0 10 27	0 10 35	0 10 50	0 11 7	0 11 30	0 12 0	0 12 36	0 13 17	0 14 2	0 14 55	0 15 50	0 16 50	0 17 59	0 19 12	0 20 30
18	0 10 25	0 10 33	0 10 47	0 11 4	0 11 27	0 11 56	0 12 31	0 13 10	0 13 55	0 14 46	0 15 40	0 16 38	0 17 45	0 18 56	0 20 12
19	0 10 23	0 10 31	0 10 44	0 11 1	0 11 24	0 11 52	0 12 26	0 13 3	0 13 48	0 14 37	0 15 30	0 16 27	0 17 32	0 18 41	0 19 55
20	0 10 22	0 10 29	0 10 41	0 10 58	0 11 21	0 11 48	0 12 21	0 12 57	0 13 41	0 14 28	0 15 20	0 16 16	0 17 19	0 18 26	0 19 38
21	0 10 20	0 10 27	0 10 38	0 10 55	0 11 17	0 11 44	0 12 16	0 12 51	0 13 34	0 14 19	0 15 10	0 16 5	0 17 6	0 18 11	0 19 22
22	0 10 18	0 10 24	0 10 35	0 10 52	0 11 13	0 11 40	0 12 10	0 12 45	0 13 27	0 14 10	0 15 0	0 15 54	0 16 54	0 17 57	0 19 6
23	0 10 15	0 10 21	0 10 33	0 10 48	0 11 9	0 11 35	0 12 4	0 12 40	0 13 20	0 14 2	0 14 51	0 15 44	0 16 42	0 17 44	0 18 51

LATITUDE 23° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 30 25	0 32 57	0 35 35	0 38 23	0 41 20	0 44 25	0 47 40	0 51 2	0 54 33	0 58 13	1 2 1	1 5 56	1 10 0	1 14 12	1 18 33
1	0 31 15	0 33 53	0 36 38	0 39 33	0 42 38	0 45 49	0 49 12	0 52 42	0 56 21	1 0 10	1 4 7	1 8 11	1 12 25	1 16 45	1 21 17
2	0 32 10	0 34 55	0 37 48	0 40 49	0 44 2	0 47 22	0 50 53	0 54 32	0 58 20	1 2 18	1 6 25	1 10 39	1 15 4	1 19 33	1 24 17
3	0 33 11	0 36 3	0 39 4	0 42 12	0 45 34	0 49 4	0 52 43	0 56 32	1 0 30	1 4 38	1 8 56	1 13 21	1 17 57	1 22 37	1 27 33
4	0 34 17	0 37 17	0 40 27	0 43 44	0 47 15	0 50 55	0 54 44	0 58 43	1 2 52	1 7 11	1 11 40	1 16 18	1 21 5	1 25 59	1 31 8
5	0 35 30	0 38 38	0 41 57	0 45 26	0 49 6	0 52 58	0 56 57	1 1 8	1 5 29	1 10 0	1 14 39	1 19 32	1 24 31	1 29 41	1 35 4
6	0 36 53	0 40 9	0 43 38	0 47 18	0 51 9	0 55 14	0 59 25	1 3 49	1 8 23	1 13 7	1 17 59	1 23 6	1 28 20	1 33 45	1 39 23
7	0 38 26	0 41 50	0 45 31	0 49 22	0 53 25	0 57 44	1 2 8	1 6 46	1 11 34	1 16 33	1 21 40	1 27 3	1 32 33	1 38 14	1 44 8
8	0 40 10	0 43 42	0 47 37	0 51 40	0 55 57	1 0 29	1 5 8	1 10 1	1 15 4	1 20 20	1 25 45	1 31 25	1 37 12	1 43 10	1 49 20
9	0 42 2	0 45 55	0 50 2	0 54 21	0 58 55	1 3 43	1 8 40	1 13 49	1 19 12	1 24 47	1 30 32	1 36 30	1 42 38	1 48 56	1 55 26
10	0 44 5	0 48 19	0 52 39	0 57 15	1 2 6	1 7 10	1 12 26	1 17 52	1 23 35	1 29 30	1 35 35	1 41 51	1 48 21	1 54 59	2 1 50
11	0 46 38	0 51 11	0 55 50	1 0 47	1 5 59	1 11 23	1 17 2	1 22 53	1 28 59	1 35 17	1 41 46	1 48 29	1 55 22	2 2 25	2 9 40
12	0 49 29	0 54 22	0 59 20	1 4 38	1 10 11	1 15 56	1 21 58	1 28 14	1 34 43	1 41 24	1 48 17	1 55 24	2 2 41	2 10 10	2 17 50
13	0 53 1	0 58 19	1 3 45	1 9 28	1 15 29	1 21 43	1 28 15	1 34 59	1 41 57	1 49 8	1 56 34	2 4 11	2 11 58	2 19 59	2 28 9
14	0 56 59	1 2 43	1 8 37	1 14 45	1 21 15	1 27 59	1 35 3	1 42 15	1 49 42	1 57 23	2 5 22	2 13 26	2 21 44	2 30 17	2 38 58
15	1 2 22	1 8 37	1 15 14	1 21 59	1 29 6	1 36 28	1 44 10	1 52 2	2 0 7	2 8 24	2 17 3	2 25 45	2 34 40	2 43 50	2 53 9
16	1 8 5	1 14 51	1 22 12	1 29 35	1 37 19	1 45 19	1 53 39	2 2 11	2 10 55	2 19 49	2 29 9	2 38 30	2 48 2	2 57 49	3 7 47
17	1 16 19	1 24 0	1 32 10	1 40 27	1 49 2	1 57 50	2 7 1	2 16 21	2 25 56	2 35 38	2 45 43	2 55 50	3 6 7	3 16 37	3 27 18
18	1 25 54	1 34 31	1 43 31	1 52 42	2 2 9	2 11 45	2 21 48	2 31 57	2 42 24	2 52 55	3 3 46	3 14 40	3 25 42	3 36 55	3 48 20
19	1 39 29	1 49 5	1 59 17	2 9 33	2 19 53	2 30 41	2 41 43	2 52 49	3 4 7	3 15 32	3 27 14	3 38 55	3 50 47	4 2 46	4 14 46
20	1 57 53	2 8 53	2 20 2	2 31 39	2 43 14	2 55 2	3 7 10	3 19 12	3 31 23	3 43 43	3 56 13	4 8 45	4 21 18	4 33 57	4 46 44
21	2 23 51	2 36 13	2 48 47	3 1 23	3 14 0	3 26 49	3 39 55	3 52 49	4 5 55	4 18 55	4 32 7	4 45 24	4 58 45	5 11 49	5 25 16
22	3 0 57	3 14 16	3 27 45	3 41 14	3 54 46	4 8 19	4 21 56	4 35 36	4 49 8	5 2 47	5 16 27	5 30 2	5 43 49	5 57 31	6 11 13
23	Not calculable.														

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 30 25	0 32 57	0 35 35	0 38 23	0 41 20	0 44 25	0 47 40	0 51 2	0 54 33	0 58 13	1 2 1	1 5 56	1 10 0	1 14 12	1 18 33
1	0 29 39	0 32 6	0 34 38	0 37 19	0 40 10	0 43 9	0 46 15	0 49 29	0 52 51	0 56 23	1 0 3	1 3 50	1 7 47	1 11 49	1 16 1
2	0 28 55	0 31 17	0 33 44	0 36 19	0 39 3	0 41 56	0 44 55	0 48 3	0 51 17	0 54 42	0 58 13	1 1 53	1 5 42	1 9 35	1 13 39
3	0 28 14	0 30 31	0 32 53	0 35 22	0 38 0	0 40 47	0 43 40	0 46 42	0 49 49	0 53 7	0 56 30	1 0 3	1 3 44	1 7 29	1 11 25
4	0 27 36	0 29 47	0 32 4	0 34 28	0 37 1	0 39 42	0 42 29	0 45 25	0 48 26	0 51 37	0 54 53	0 58 19	1 1 52	1 5 30	1 9 18
5	0 27 0	0 29 5	0 31 18	0 33 37	0 36 5	0 38 41	0 41 22	0 44 12	0 47 8	0 50 12	0 53 22	0 56 41	1 0 6	1 3 38	1 7 18
6	0 26 26	0 28 26	0 30 35	0 32 50	0 35 13	0 37 44	0 40 19	0 43 3	0 45 55	0 48 53	0 51 56	0 55 9	0 58 27	1 1 53	1 5 25
7	0 25 54	0 27 50	0 29 55	0 32 6	0 34 24	0 36 50	0 39 21	0 41 59	0 44 46	0 47 38	0 50 36	0 53 43	0 56 54	1 0 14	1 3 39
8	0 25 24	0 27 17	0 29 17	0 31 24	0 33 38	0 35 59	0 38 27	0 40 59	0 43 41	0 46 28	0 49 21	0 52 22	0 55 28	0 58 42	1 2 0
9	0 24 55	0 26 46	0 28 42	0 30 45	0 32 55	0 35 11	0 37 36	0 40 3	0 42 40	0 45 22	0 48 11	0 51 6	0 54 7	0 57 15	1 0 28
10	0 24 28	0 26 17	0 28 9	0 30 9	0 32 15	0 34 27	0 36 47	0 39 11	0 41 43	0 44 20	0 47 5	0 49 55	0 52 51	0 55 53	0 59 1
11	0 24 3	0 25 49	0 27 38	0 29 35	0 31 43	0 33 45	0 36 1	0 38 21	0 40 49	0 43 22	0 46 2	0 48 48	0 51 39	0 54 36	0 57 39
12	0 23 39	0 25 22	0 27 8	0 29 2	0 31 6	0 33 5	0 35 17	0 37 33	0 39 57	0 42 26	0 45 2	0 47 44	0 50 31	0 53 23	0 56 21
13	0 23 16	0 24 56	0 26 39	0 28 30	0 30 31	0 32 27	0 34 36	0 36 48	0 39 8	0 41 33	0 44 4	0 46 42	0 49 25	0 52 13	0 55 6
14	0 22 54	0 24 31	0 26 11	0 27 59	0 29 57	0 31 50	0 33 56	0 36 4	0 38 20	0 40 41	0 43 8	0 45 42	0 48 21	0 51 5	0 53 53
15	0 22 33	0 24 7	0 25 44	0 27 27	0 29 24	0 31 14	0 33 17	0 35 22	0 37 34	0 39 51	0 42 14	0 44 44	0 47 19	0 49 59	0 52 43
16	0 22 12	0 23 43	0 25 18	0 26 58	0 28 52	0 30 39	0 32 39	0 34 41	0 36 50	0 39 3	0 41 22	0 43 48	0 46 19	0 48 55	0 51 35
17	0 21 52	0 23 20	0 24 53	0 26 30	0 28 22	0 30 6	0 32 3	0 34 2	0 36 7	0 38 17	0 40 32	0 42 54	0 45 21	0 47 53	0 50 29
18	0 21 32	0 22 58	0 24 29	0 26 3	0 27 53	0 29 34	0 31 28	0 33 24	0 35 26	0 37 32	0 39 44	0 42 2	0 44 25	0 46 53	0 49 25
19	0 21 13	0 22 37	0 24 6	0 25 37	0 27 25	0 29 3	0 30 54	0 32 47	0 34 46	0 36 49	0 38 58	0 41 12	0 43 31	0 45 55	0 48 23
20	0 20 55	0 22 16	0 23 44	0 25 15	0 26 52	0 28 33	0 30 21	0 32 11	0 34 7	0 36 7	0 38 14	0 40 24	0 42 39	0 44 59	0 47 23
21	0 20 37	0 21 56	0 23 22	0 24 51	0 26 26	0 28 4	0 29 49	0 31 36	0 33 29	0 35 26	0 37 31	0 39 38	0 41 50	0 44 6	0 46 27
22	0 20 19	0 21 37	0 23 1	0 24 27	0 26 0	0 27 36	0 29 18	0 31 3	0 32 53	0 34 47	0 36 49	0 38 53	0 41 2	0 43 15	0 45 33
23	0 20 2	0 21 19	0 22 40	0 24 4	0 25 35	0 27 8	0 28 48	0 30 31	0 32 19	0 34 10	0 36 8	0 38 10	0 40 16	0 42 25	0 44 41

LATITUDE 23° NORTH OR SOUTH.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 23 2	1 27 38	1 32 23	1 37 15	1 42 14	1 47 22	1 52 37	1 57 59	2 3 29	2 9 6	2 14 51	2 20 42	2 26 40	2 32 46	2 38 59
1	1 20 20	1 24 42	1 29 16	1 33 57	1 38 45	1 43 43	1 48 49	1 54 0	1 59 18	2 4 42	2 10 21	2 16 0	2 21 45	2 27 39	2 33 40
2	1 17 48	1 21 59	1 26 23	1 30 54	1 35 32	1 40 20	1 45 16	1 50 17	1 55 25	2 0 38	2 6 8	2 11 36	2 17 9	2 22 51	2 28 41
3	1 15 25	1 19 28	1 23 43	1 28 5	1 32 34	1 37 12	1 41 58	1 46 50	1 51 48	1 56 51	2 2 10	2 7 28	2 12 51	2 18 22	2 24 1
4	1 13 10	1 17 7	1 21 14	1 25 28	1 29 49	1 34 18	1 38 54	1 43 37	1 48 26	1 53 20	1 58 26	2 3 34	2 8 49	2 14 10	2 19 38
5	1 11 3	1 14 55	1 18 55	1 23 2	1 27 16	1 31 36	1 36 3	1 40 37	1 45 17	1 50 3	1 54 55	1 59 54	2 5 0	2 10 12	2 15 30
6	1 9 3	1 12 50	1 16 43	1 20 43	1 24 50	1 29 3	1 33 22	1 37 47	1 42 19	1 46 56	1 51 36	1 56 26	2 1 23	2 6 27	2 11 36
7	1 7 11	1 10 53	1 14 38	1 18 31	1 22 31	1 26 37	1 30 49	1 35 6	1 39 29	1 43 57	1 48 28	1 53 10	1 57 59	2 2 55	2 7 55
8	1 5 26	1 9 2	1 12 40	1 16 26	1 20 19	1 24 18	1 28 23	1 32 32	1 36 47	1 41 7	1 45 31	1 50 5	1 54 46	1 59 34	2 4 26
9	1 3 48	1 7 16	1 10 48	1 14 27	1 18 13	1 22 5	1 26 3	1 30 5	1 34 13	1 38 26	1 42 44	1 47 11	1 51 44	1 56 23	2 1 7
10	1 2 15	1 5 35	1 9 1	1 12 34	1 16 13	1 19 58	1 23 49	1 27 45	1 31 46	1 35 53	1 40 6	1 44 26	1 48 51	1 53 22	1 57 58
11	1 0 48	1 3 59	1 7 20	1 10 47	1 14 20	1 17 59	1 21 44	1 25 33	1 29 27	1 33 28	1 37 36	1 41 49	1 46 6	1 50 29	1 54 58
12	0 59 24	1 2 28	1 5 44	1 9 6	1 12 33	1 16 6	1 19 45	1 23 27	1 27 15	1 31 10	1 35 13	1 39 19	1 43 28	1 47 44	1 52 6
13	0 58 4	1 1 2	1 4 13	1 7 30	1 10 51	1 14 18	1 17 51	1 21 27	1 25 9	1 28 58	1 32 55	1 36 54	1 40 57	1 45 7	1 49 22
14	0 56 47	0 59 40	1 2 46	1 5 57	1 9 13	1 12 34	1 16 1	1 19 32	1 23 9	1 26 52	1 30 42	1 34 35	1 38 32	1 42 36	1 46 45
15	0 55 33	0 58 21	1 1 22	1 4 28	1 7 39	1 10 55	1 14 16	1 17 42	1 21 14	1 24 52	1 28 34	1 32 21	1 36 13	1 40 11	1 44 14
16	0 54 21	0 57 5	1 0 1	1 3 2	1 6 8	1 9 19	1 12 35	1 15 56	1 19 23	1 22 55	1 26 31	1 30 13	1 33 59	1 37 51	1 41 48
17	0 53 11	0 55 52	0 58 43	1 1 40	1 4 41	1 7 47	1 10 58	1 14 14	1 17 36	1 21 3	1 24 34	1 28 10	1 31 51	1 35 37	1 39 28
18	0 52 3	0 54 42	0 57 29	1 0 21	1 3 18	1 6 19	1 9 25	1 12 36	1 15 53	1 19 15	1 22 42	1 26 12	1 29 48	1 33 28	1 37 14
19	0 50 57	0 53 34	0 56 17	0 59 5	1 1 58	1 4 55	1 7 56	1 11 3	1 14 15	1 17 32	1 20 54	1 24 19	1 27 50	1 31 25	1 35 5
20	0 49 53	0 52 28	0 55 7	0 57 51	1 0 40	1 3 33	1 6 31	1 9 34	1 12 41	1 15 53	1 19 10	1 22 31	1 25 57	1 29 27	1 33 2
21	0 48 53	0 51 24	0 53 59	0 56 40	0 59 25	1 2 14	1 5 8	1 8 7	1 11 10	1 14 17	1 17 29	1 20 46	1 24 7	1 27 32	1 31 2
22	0 47 55	0 50 23	0 52 54	0 55 31	0 58 12	1 0 58	1 3 48	1 6 43	1 9 41	1 12 43	1 15 51	1 19 3	1 22 20	1 25 40	1 29 5
23	0 47 0	0 49 24	0 51 52	0 54 24	0 57 10	0 59 43	1 2 30	1 5 21	1 8 15	1 11 12	1 14 15	1 17 23	1 20 35	1 23 50	1 27 10

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	2 45 18	2 51 44	2 58 16	3 4 56	3 11 40	3 18 34	3 25 32	3 32 36	3 39 47	3 47 3	3 54 27	4 1 55	4 9 28	4 17 9	4 24 56
1	2 39 47	2 46 0	2 52 20	2 58 48	3 5 21	3 12 1	3 18 47	3 25 37	3 32 35	3 39 19	3 46 28	3 53 41	4 1 9	4 8 37	4 16 11
2	2 34 37	2 40 38	2 46 47	2 53 3	2 59 24	3 5 51	3 12 25	3 19 3	3 25 48	3 32 15	3 39 11	3 46 11	3 53 29	4 0 44	4 8 6
3	2 29 46	2 35 36	2 41 34	2 47 38	2 53 48	3 0 3	3 6 25	3 12 51	3 19 24	3 25 45	3 32 29	3 39 17	3 46 21	3 53 24	4 0 34
4	2 25 12	2 30 52	2 36 39	2 42 32	2 48 31	2 54 36	3 0 46	3 7 1	3 13 23	3 19 42	3 26 15	3 32 52	3 39 40	3 46 31	3 53 29
5	2 20 54	2 26 24	2 32 1	2 37 44	2 43 33	2 49 27	2 55 26	3 1 31	3 7 43	3 14 0	3 20 23	3 26 50	3 33 22	3 40 1	3 46 47
6	2 16 51	2 22 11	2 27 38	2 33 11	2 38 51	2 44 34	2 50 24	2 56 20	3 2 22	3 8 36	3 14 48	3 21 5	3 27 23	3 33 51	3 40 25
7	2 13 1	2 18 12	2 23 30	2 28 53	2 34 24	2 39 57	2 45 38	2 51 25	2 57 18	3 3 25	3 9 27	3 15 34	3 21 41	3 27 59	3 34 21
8	2 9 24	2 14 26	2 19 35	2 24 49	2 30 11	2 35 35	2 41 6	2 46 44	2 52 28	2 58 26	3 4 18	3 10 16	3 16 14	3 22 22	3 28 33
9	2 5 57	2 10 52	2 15 52	2 20 58	2 26 10	2 31 26	2 36 48	2 42 17	2 47 52	2 53 38	2 59 20	3 5 10	3 11 1	3 17 0	3 23 1
10	2 2 40	2 7 29	2 12 20	2 17 18	2 22 21	2 27 30	2 32 44	2 38 4	2 43 30	2 49 0	2 54 33	3 0 15	3 6 2	3 11 52	3 17 44
11	1 59 33	2 4 14	2 8 58	2 13 48	2 18 43	2 23 44	2 28 50	2 34 2	2 39 19	2 44 42	2 50 6	2 55 39	3 1 17	3 6 58	3 12 42
12	1 56 34	2 1 8	2 5 45	2 10 27	2 15 15	2 20 8	2 25 6	2 30 10	2 35 18	2 40 34	2 45 50	2 51 15	2 56 45	3 2 17	3 7 53
13	1 53 43	1 57 10	2 2 40	2 7 15	2 11 56	2 16 41	2 21 32	2 26 28	2 31 28	2 36 36	2 41 45	2 47 2	2 52 24	2 57 49	3 3 17
14	1 50 59	1 54 19	1 59 43	2 4 11	2 8 45	2 13 23	2 18 7	2 22 56	2 27 48	2 32 48	2 37 50	2 42 59	2 48 14	2 53 32	2 58 53
15	1 48 21	1 52 34	1 59 53	2 1 15	2 5 42	2 10 14	2 14 51	2 19 32	2 24 18	2 29 9	2 34 4	2 39 6	2 44 14	2 49 25	2 54 39
16	1 45 49	1 49 56	1 54 9	1 58 26	2 2 47	2 7 13	2 11 43	2 16 18	2 20 56	2 25 39	2 30 27	2 35 22	2 40 23	2 45 27	2 50 34
17	1 43 23	1 47 24	1 51 31	1 55 43	1 59 58	2 4 18	2 8 42	2 13 11	2 17 41	2 22 17	2 26 58	2 31 45	2 36 40	2 41 37	2 46 37
18	1 41 3	1 44 58	1 48 59	1 53 6	1 57 15	2 1 29	2 5 47	2 10 9	2 14 33	2 19 3	2 23 37	2 28 17	2 33 5	2 37 55	2 42 48
19	1 38 49	1 42 38	1 46 33	1 50 34	1 54 37	1 58 45	2 2 57	2 7 13	2 11 32	2 15 56	2 20 23	2 24 56	2 29 37	2 34 20	2 39 7
20	1 36 41	1 40 25	1 44 14	1 48 7	1 52 4	1 56 6	2 0 12	2 4 22	2 8 37	2 12 55	2 17 15	2 21 43	2 26 16	2 30 53	2 35 34
21	1 34 36	1 38 15	1 41 59	1 45 45	1 49 36	1 53 33	1 57 33	2 1 48	2 5 47	2 10 0	2 14 14	2 18 36	2 23 2	2 27 33	2 32 8
22	1 32 34	1 36 8	1 39 47	1 43 28	1 47 13	1 51 5	1 55 0	1 59 10	2 3 3	2 7 10	2 11 19	2 15 35	2 19 55	2 24 20	2 28 50
23	1 30 35	1 34 4	1 37 38	1 41 15	1 44 56	1 48 42	1 52 32	1 56 26	2 0 24	2 4 25	2 8 30	2 12 40	2 16 55	2 21 14	2 25 38

LATITUDE 24° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 53	0 11 7	0 11 29	0 12 0	0 12 39	0 13 27	0 14 25	0 15 32	0 16 46	0 18 9	0 19 40	0 21 22	0 23 11	0 25 9	0 27 16
1	0 10 54	0 11 8	0 11 32	0 12 3	0 12 45	0 13 35	0 14 36	0 15 44	0 17 1	0 18 30	0 20 5	0 21 50	0 23 42	0 25 44	0 27 56
2	0 10 56	0 11 9	0 11 35	0 12 7	0 12 51	0 13 43	0 14 47	0 15 57	0 17 17	0 18 51	0 20 31	0 22 19	0 24 15	0 26 22	0 28 40
3	0 10 58	0 11 11	0 11 39	0 12 11	0 12 58	0 13 51	0 14 58	0 16 11	0 17 35	0 19 13	0 20 57	0 22 49	0 24 52	0 27 3	0 29 28
4	0 10 59	0 11 14	0 11 40	0 12 16	0 13 5	0 14 1	0 15 9	0 16 26	0 17 56	0 19 36	0 21 25	0 23 23	0 25 32	0 27 49	0 30 21
5	0 11 0	0 11 17	0 11 42	0 12 22	0 13 12	0 14 12	0 15 22	0 16 42	0 18 19	0 20 1	0 21 55	0 24 0	0 26 15	0 28 41	0 31 19
6	0 11 1	0 11 19	0 11 46	0 12 27	0 13 20	0 14 24	0 15 37	0 17 1	0 18 43	0 20 30	0 22 29	0 24 41	0 27 2	0 29 38	0 32 23
7	0 11 3	0 11 21	0 11 50	0 12 33	0 13 28	0 14 36	0 15 54	0 17 23	0 19 9	0 21 2	0 23 7	0 25 26	0 27 54	0 30 40	0 33 33
8	0 11 5	0 11 24	0 11 54	0 12 39	0 13 37	0 14 48	0 16 13	0 17 47	0 19 37	0 21 38	0 23 51	0 26 18	0 28 56	0 31 48	0 34 49
9	0 11 6	0 11 26	0 11 59	0 12 46	0 13 48	0 15 3	0 16 31	0 18 12	0 20 9	0 22 18	0 24 39	0 27 15	0 30 5	0 33 6	0 36 18
10	0 11 8	0 11 29	0 12 5	0 12 53	0 14 2	0 15 22	0 16 54	0 18 42	0 20 46	0 23 4	0 25 34	0 28 20	0 31 22	0 34 32	0 37 55
11	0 11 9	0 11 31	0 12 11	0 13 4	0 14 17	0 15 42	0 17 21	0 19 17	0 21 32	0 23 56	0 26 37	0 29 34	0 32 48	0 36 13	0 39 52
12	0 11 11	0 11 34	0 12 18	0 13 16	0 14 34	0 16 4	0 17 51	0 19 55	0 22 22	0 24 57	0 27 50	0 30 59	0 34 25	0 38 6	0 42 1
13	0 11 12	0 11 38	0 12 26	0 13 29	0 14 54	0 16 34	0 18 31	0 20 46	0 23 23	0 26 13	0 29 20	0 32 46	0 36 31	0 40 30	0 44 45
14	0 11 14	0 11 43	0 12 35	0 13 43	0 15 15	0 17 5	0 19 12	0 21 39	0 24 27	0 27 33	0 30 55	0 34 38	0 38 42	0 42 59	0 47 31
15	0 11 16	0 11 47	0 12 45	0 14 1	0 15 42	0 17 44	0 20 6	0 22 50	0 25 58	0 29 24	0 33 8	0 37 13	0 41 42	0 46 25	0 51 29
16	0 11 18	0 11 52	0 12 56	0 14 24	0 16 15	0 18 30	0 21 7	0 24 8	0 27 36	0 31 23	0 35 30	0 39 58	0 44 53	0 50 2	0 55 34
17	0 11 23	0 12 2	0 13 12	0 14 52	0 17 1	0 19 34	0 22 37	0 26 2	0 30 4	0 34 21	0 39 2	0 44 7	0 49 41	0 55 28	1 1 40
18	0 11 28	0 12 14	0 13 33	0 15 26	0 17 53	0 20 45	0 24 14	0 28 3	0 32 39	0 37 26	0 42 41	0 48 24	0 54 37	1 1 3	1 7 54
19	0 11 32	0 12 28	0 13 57	0 16 16	0 19 12	0 22 37	0 26 37	0 31 12	0 36 23	0 41 57	0 48 2	0 54 41	1 1 45	1 9 8	1 16 50
20	0 11 38	0 12 45	0 14 42	0 17 30	0 20 55	0 25 13	0 30 2	0 35 40	0 41 47	0 48 42	0 55 47	1 3 33	1 11 41	1 20 15	1 29 3
21	0 11 44	0 13 18	0 15 46	0 18 30	0 23 55	0 29 25	0 35 39	0 42 33	0 50 18	0 58 25	1 7 1	1 16 14	1 25 44	1 35 50	1 46 5
22	0 11 54	0 14 22	0 18 13	0 23 16	0 29 32	0 36 58	0 45 16	0 54 13	1 3 58	1 14 13	1 24 45	1 35 45	1 46 56	1 58 43	2 10 34
23	0 12 50	0 17 20	0 23 50	0 32 29	0 42 50	0 53 14	1 4 45	1 16 28	1 28 51	1 41 17	1 53 51	2 6 55	2 19 41	2 32 54	2 46 0

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 53	0 11 7	0 11 29	0 12 0	0 12 39	0 13 27	0 14 25	0 15 32	0 16 46	0 18 9	0 19 40	0 21 22	0 23 11	0 25 9	0 27 16
1	0 10 51	0 11 5	0 11 26	0 11 55	0 12 34	0 13 20	0 14 16	0 15 20	0 16 32	0 17 52	0 19 18	0 20 55	0 22 41	0 24 34	0 26 36
2	0 10 49	0 11 3	0 11 23	0 11 51	0 12 29	0 13 13	0 14 7	0 15 9	0 16 18	0 17 35	0 18 58	0 20 31	0 22 13	0 24 2	0 26 0
3	0 10 48	0 11 1	0 11 20	0 11 47	0 12 24	0 13 7	0 13 58	0 14 58	0 16 5	0 17 19	0 18 40	0 20 9	0 21 48	0 23 33	0 25 27
4	0 10 47	0 10 59	0 11 17	0 11 43	0 12 19	0 13 1	0 13 50	0 14 47	0 15 52	0 17 4	0 18 23	0 19 49	0 21 25	0 23 6	0 24 56
5	0 10 46	0 10 57	0 11 14	0 11 39	0 12 14	0 12 55	0 13 42	0 14 36	0 15 40	0 16 50	0 18 7	0 19 30	0 21 3	0 22 41	0 24 27
6	0 10 45	0 10 55	0 11 11	0 11 36	0 12 10	0 12 49	0 13 35	0 14 28	0 15 29	0 16 37	0 17 52	0 19 12	0 20 42	0 22 18	0 24 0
7	0 10 44	0 10 53	0 11 9	0 11 33	0 12 6	0 12 43	0 13 28	0 14 20	0 15 19	0 16 25	0 17 37	0 18 55	0 20 22	0 21 55	0 23 34
8	0 10 42	0 10 51	0 11 7	0 11 30	0 12 2	0 12 37	0 13 21	0 14 12	0 15 9	0 16 13	0 17 23	0 18 39	0 20 3	0 21 33	0 23 9
9	0 10 40	0 10 49	0 11 5	0 11 27	0 11 58	0 12 32	0 13 15	0 14 4	0 14 59	0 16 1	0 17 9	0 18 23	0 19 45	0 21 12	0 22 45
10	0 10 38	0 10 48	0 11 3	0 11 24	0 11 54	0 12 27	0 13 9	0 13 56	0 14 50	0 15 50	0 16 56	0 18 8	0 19 27	0 20 52	0 22 22
11	0 10 37	0 10 46	0 11 0	0 11 21	0 11 50	0 12 22	0 13 3	0 13 49	0 14 42	0 15 40	0 16 44	0 17 54	0 19 10	0 20 33	0 22 1
12	0 10 36	0 10 44	0 10 57	0 11 18	0 11 46	0 12 17	0 12 57	0 13 42	0 14 34	0 15 30	0 16 33	0 17 41	0 18 54	0 20 15	0 21 41
13	0 10 34	0 10 42	0 10 54	0 11 15	0 11 42	0 12 12	0 12 51	0 13 35	0 14 26	0 15 20	0 16 22	0 17 28	0 18 39	0 19 58	0 21 22
14	0 10 32	0 10 40	0 10 51	0 11 12	0 11 38	0 12 8	0 12 45	0 13 28	0 14 18	0 15 11	0 16 11	0 17 15	0 18 25	0 19 42	0 21 4
15	0 10 30	0 10 38	0 10 48	0 11 9	0 11 34	0 12 4	0 12 40	0 13 22	0 14 10	0 15 2	0 16 0	0 17 2	0 18 11	0 19 26	0 20 46
16	0 10 28	0 10 36	0 10 46	0 11 6	0 11 30	0 12 0	0 12 35	0 13 16	0 14 2	0 14 53	0 15 50	0 16 50	0 17 58	0 19 11	0 20 29
17	0 10 26	0 10 34	0 10 44	0 11 3	0 11 27	0 11 56	0 12 30	0 13 10	0 13 54	0 14 44	0 15 40	0 16 39	0 17 45	0 18 56	0 20 12
18	0 10 24	0 10 32	0 10 42	0 11 0	0 11 24	0 11 52	0 12 25	0 13 4	0 13 47	0 14 36	0 15 30	0 16 28	0 17 32	0 18 41	0 19 55
19	0 10 22	0 10 30	0 10 40	0 10 57	0 11 21	0 11 48	0 12 20	0 12 58	0 13 40	0 14 28	0 15 20	0 16 17	0 17 19	0 18 26	0 19 38
20	0 10 20	0 10 27	0 10 38	0 10 55	0 11 18	0 11 44	0 12 15	0 12 12	0 13 33	0 14 20	0 15 10	0 16 6	0 17 6	0 18 12	0 19 22
21	0 10 18	0 10 24	0 10 36	0 10 52	0 11 15	0 11 40	0 12 10	0 12 46	0 13 26	0 14 11	0 15 0	0 15 55	0 16 54	0 17 58	0 19 6
22	0 10 16	0 10 21	0 10 33	0 10 49	0 11 11	0 11 36	0 12 5	0 12 40	0 13 20	0 14 3	0 14 51	0 15 45	0 16 42	0 17 45	0 18 51
23	0 10 13	0 10 19	0 10 30	0 10 46	0 11 7	0 11 31	0 12 0	0 12 34	0 13 14	0 13 55	0 14 42	0 15 35	0 16 31	0 17 33	0 18 37

LATITUDE 24° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 29 31	0 31 54	0 34 26	0 37 7	0 39 55	0 42 53	0 45 57	0 49 12	0 52 34	0 56 3	0 59 41	1 3 26	1 7 20	1 11 21	1 15 30
1	0 30 17	0 32 46	0 35 24	0 38 10	0 41 6	0 44 10	0 47 23	0 50 43	0 54 13	0 57 52	1 1 38	1 5 33	1 9 37	1 13 47	1 18 6
2	0 31 7	0 33 42	0 36 27	0 39 19	0 42 22	0 45 33	0 48 55	0 52 23	0 56 1	0 59 49	1 3 43	1 7 48	1 12 2	1 16 22	1 20 51
3	0 32 1	0 34 43	0 37 34	0 40 34	0 43 44	0 47 3	0 50 34	0 54 11	0 57 57	1 1 51	1 5 58	1 10 13	1 14 37	1 19 6	1 23 45
4	0 33 0	0 35 49	0 38 49	0 41 57	0 45 15	0 48 43	0 52 23	0 56 9	1 0 5	1 4 12	1 8 26	1 12 51	1 17 26	1 22 6	1 26 56
5	0 34 5	0 37 2	0 40 12	0 43 28	0 46 56	0 50 33	0 54 22	0 58 19	1 2 26	1 6 42	1 11 9	1 15 43	1 20 29	1 25 23	1 30 26
6	0 35 17	0 38 23	0 41 42	0 45 8	0 48 47	0 52 34	0 56 33	1 0 41	1 5 0	1 9 27	1 14 8	1 18 53	1 23 52	1 29 0	1 34 18
7	0 36 36	0 39 52	0 43 21	0 46 58	0 50 48	0 54 47	0 58 58	1 3 18	1 7 51	1 12 30	1 17 25	1 22 24	1 27 36	1 32 59	1 38 32
8	0 38 3	0 41 32	0 45 11	0 48 58	0 52 59	0 57 13	1 1 39	1 6 11	1 10 57	1 15 50	1 21 1	1 26 17	1 31 43	1 37 22	1 43 12
9	0 39 45	0 43 27	0 47 17	0 51 19	0 55 35	1 0 3	1 4 44	1 9 32	1 14 26	1 19 45	1 25 12	1 30 46	1 36 31	1 42 28	1 48 37
10	0 41 35	0 45 31	0 49 32	0 53 50	0 58 21	1 3 3	1 8 0	1 13 4	1 18 7	1 23 52	1 29 35	1 35 27	1 41 30	1 47 45	1 54 13
11	0 43 46	0 47 56	0 52 17	0 56 56	1 1 45	1 6 46	1 12 2	1 17 25	1 22 56	1 28 43	1 34 48	1 41 1	1 47 25	1 54 1	2 0 51
12	0 46 10	0 50 35	0 55 16	1 0 7	1 5 15	1 10 36	1 16 12	1 21 54	1 27 53	1 34 6	1 40 34	1 47 9	1 53 55	2 0 53	2 8 5
13	0 48 15	0 53 1	0 58 3	1 3 19	1 8 49	1 14 35	1 20 37	1 26 46	1 33 11	1 40 28	1 47 21	1 54 24	2 1 37	2 9 3	2 16 43
14	0 52 26	0 57 34	1 2 57	1 8 38	1 14 30	1 20 41	1 27 9	1 33 45	1 40 37	1 47 41	1 54 59	2 2 30	2 10 10	2 18 5	2 26 13
15	0 56 48	1 2 26	1 8 18	1 14 31	1 20 57	1 27 39	1 34 39	1 41 49	1 49 14	1 56 52	2 4 44	2 12 49	2 21 4	2 29 32	2 38 13
16	1 1 21	1 7 29	1 13 51	1 20 36	1 27 37	1 34 51	1 42 23	1 50 7	1 58 6	2 6 18	2 14 44	2 23 24	2 32 14	2 41 15	2 50 30
17	1 8 6	1 14 55	1 22 4	1 29 31	1 37 15	1 45 13	1 53 30	2 1 55	2 10 39	2 19 33	2 28 43	2 38 3	2 47 34	2 57 15	3 7 7
18	1 14 59	1 22 36	1 30 33	1 38 42	1 47 9	1 55 51	2 4 53	2 13 59	2 23 28	2 33 4	2 42 58	2 52 59	3 3 12	3 13 33	3 24 2
19	1 25 0	1 33 33	1 42 29	1 51 31	2 0 48	2 10 29	2 20 23	2 30 23	2 40 41	2 51 6	3 1 49	3 12 37	3 23 26	3 34 44	3 45 19
20	1 38 24	1 47 56	1 57 53	2 8 5	2 18 30	2 29 1	2 39 59	2 51 1	3 2 12	3 13 30	3 25 1	3 36 42	3 48 29	4 0 22	4 12 21
21	1 56 56	2 7 34	2 18 42	2 30 1	2 41 36	2 53 21	3 4 45	3 17 13	3 29 17	3 41 31	3 53 52	4 6 21	4 18 48	4 31 43	4 44 3
22	2 22 35	2 34 45	2 47 13	2 59 42	3 12 15	3 24 53	3 37 51	3 50 40	4 3 40	4 16 36	4 29 39	4 42 48	4 55 57	5 9 9	5 22 22
23	2 59 20	3 12 36	3 25 58	3 39 21	3 52 46	4 6 14	4 19 45	4 33 14	4 46 45	5 0 16	5 13 46	5 27 25	5 40 56	5 54 37	6 8 10

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 29 31	0 31 54	0 34 26	0 37 7	0 39 55	0 42 53	0 45 57	0 49 12	0 52 34	0 56 3	0 59 41	1 3 26	1 7 20	1 11 21	1 15 30
1	0 28 46	0 31 5	0 33 33	0 36 8	0 38 50	0 41 42	0 44 40	0 47 47	0 51 2	0 54 23	0 57 52	1 1 29	1 5 16	1 9 10	1 13 10
2	0 28 5	0 30 19	0 32 43	0 35 12	0 37 49	0 40 35	0 43 27	0 46 27	0 49 35	0 52 49	0 56 11	0 59 40	1 3 20	1 7 6	1 10 59
3	0 27 28	0 29 37	0 31 56	0 34 20	0 36 52	0 39 32	0 42 18	0 45 12	0 48 13	0 51 21	0 54 36	0 57 58	1 1 31	1 5 9	1 8 55
4	0 26 53	0 28 58	0 31 12	0 33 31	0 35 58	0 38 32	0 41 13	0 44 1	0 46 56	0 49 58	0 53 7	0 56 23	0 59 49	1 3 19	1 6 58
5	0 26 20	0 28 21	0 30 30	0 32 44	0 35 6	0 37 35	0 40 11	0 42 54	0 45 43	0 48 40	0 51 44	0 54 54	0 58 13	1 1 36	1 5 8
6	0 25 49	0 27 46	0 29 50	0 32 0	0 34 17	0 36 42	0 39 13	0 41 51	0 44 35	0 47 27	0 50 26	0 53 31	0 56 43	1 0 0	1 3 25
7	0 25 20	0 27 13	0 29 12	0 31 18	0 33 31	0 35 52	0 38 19	0 40 52	0 43 31	0 46 18	0 49 12	0 52 12	0 55 18	0 58 29	1 1 48
8	0 24 52	0 26 42	0 28 37	0 30 39	0 32 48	0 35 5	0 37 28	0 39 56	0 42 31	0 45 13	0 48 2	0 50 57	0 53 57	0 57 3	1 0 16
9	0 24 26	0 26 13	0 28 4	0 30 3	0 32 8	0 34 21	0 36 40	0 39 3	0 41 34	0 44 11	0 46 56	0 49 45	0 52 40	0 55 41	0 58 49
10	0 24 1	0 25 46	0 27 33	0 29 29	0 31 31	0 33 40	0 35 55	0 38 14	0 40 41	0 43 13	0 45 53	0 48 36	0 51 26	0 54 22	0 57 26
11	0 23 37	0 25 19	0 27 3	0 28 56	0 30 55	0 33 1	0 35 12	0 37 28	0 39 51	0 42 17	0 44 53	0 47 30	0 50 14	0 53 6	0 56 5
12	0 23 14	0 24 53	0 26 34	0 28 24	0 30 21	0 32 23	0 34 31	0 36 44	0 39 3	0 41 24	0 43 56	0 46 27	0 49 6	0 51 54	0 54 48
13	0 22 52	0 24 28	0 26 7	0 27 54	0 29 48	0 31 47	0 33 52	0 36 2	0 38 17	0 40 33	0 43 1	0 45 27	0 48 2	0 50 46	0 53 35
14	0 22 31	0 24 4	0 25 41	0 27 25	0 29 16	0 31 12	0 33 14	0 35 21	0 37 32	0 39 44	0 42 8	0 44 30	0 47 1	0 49 41	0 52 26
15	0 22 11	0 23 41	0 25 16	0 26 57	0 28 45	0 30 38	0 32 37	0 34 41	0 36 48	0 38 57	0 41 17	0 43 36	0 46 3	0 48 39	0 51 20
16	0 21 51	0 23 19	0 24 52	0 26 30	0 28 15	0 30 5	0 32 1	0 34 2	0 36 6	0 38 12	0 40 28	0 42 44	0 45 8	0 47 40	0 50 17
17	0 21 32	0 22 58	0 24 29	0 26 4	0 27 46	0 29 33	0 31 26	0 33 24	0 35 25	0 37 29	0 39 41	0 41 54	0 44 15	0 46 43	0 49 16
18	0 21 13	0 22 37	0 24 6	0 25 39	0 27 18	0 29 2	0 30 52	0 32 47	0 34 45	0 36 47	0 38 56	0 41 6	0 43 24	0 45 48	0 48 17
19	0 20 54	0 22 16	0 23 43	0 25 14	0 26 51	0 28 32	0 30 19	0 32 11	0 34 6	0 36 6	0 38 12	0 40 20	0 42 35	0 44 55	0 47 20
20	0 20 36	0 21 56	0 23 21	0 24 50	0 26 25	0 28 3	0 29 47	0 31 36	0 33 28	0 35 26	0 37 29	0 39 36	0 41 48	0 44 4	0 46 25
21	0 20 19	0 21 37	0 23 0	0 24 27	0 26 0	0 27 36	0 29 17	0 31 3	0 32 52	0 34 47	0 36 48	0 38 53	0 41 2	0 43 14	0 45 32
22	0 20 2	0 21 19	0 22 40	0 24 5	0 25 35	0 27 9	0 28 48	0 30 31	0 32 18	0 34 10	0 36 8	0 38 10	0 40 16	0 42 26	0 44 41
23	0 19 46	0 21 1	0 22 20	0 23 43	0 25 11	0 26 43	0 28 20	0 30 0	0 31 45	0 33 35	0 35 29	0 37 28	0 39 31	0 41 38	0 43 50

LATITUDE 24° NORTH OR SOUTH.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 19 47	1 24 12	1 28 45	1 33 25	1 38 12	1 43 7	1 48 8	1 53 18	1 58 35	2 3 58	2 9 29	2 15 5	2 20 50	2 26 41	2 32 39
1	1 17 19	1 21 34	1 25 57	1 30 28	1 35 5	1 39 51	1 44 42	1 49 42	1 54 49	2 0 1	2 5 22	2 10 48	2 16 23	2 22 3	2 27 51
2	1 15 0	1 19 5	1 23 20	1 27 41	1 32 9	1 36 56	1 41 28	1 46 19	1 51 16	1 56 17	2 1 28	2 6 45	2 12 10	2 17 40	2 23 17
3	1 12 48	1 16 45	1 20 52	1 25 4	1 29 24	1 34 2	1 38 25	1 43 7	1 47 55	1 52 46	1 57 47	2 2 55	2 8 10	2 13 30	2 18 57
4	1 10 43	1 14 33	1 18 32	1 22 36	1 26 48	1 31 18	1 35 33	1 40 6	1 44 45	1 49 27	1 54 19	1 59 18	2 4 23	2 9 33	2 14 50
5	1 8 45	1 12 29	1 16 20	1 20 17	1 24 21	1 28 33	1 32 51	1 37 15	1 41 45	1 46 20	1 51 3	1 55 53	2 0 48	2 5 48	2 10 55
6	1 6 56	1 10 32	1 14 16	1 18 7	1 22 4	1 26 7	1 30 18	1 34 34	1 38 55	1 43 24	1 47 59	1 52 39	1 57 26	2 2 18	2 7 13
7	1 5 13	1 8 42	1 12 20	1 16 5	1 19 55	1 23 50	1 27 54	1 32 3	1 36 15	1 40 38	1 45 4	1 49 36	1 54 15	1 58 59	2 3 45
8	1 3 35	1 6 58	1 10 30	1 14 9	1 17 53	1 21 40	1 25 37	1 29 40	1 33 45	1 38 0	1 42 18	1 46 43	1 51 14	1 55 51	2 0 30
9	1 2 2	1 5 20	1 8 46	1 12 19	1 15 57	1 19 38	1 23 28	1 27 24	1 31 23	1 35 30	1 39 41	1 43 59	1 48 23	1 52 53	1 57 26
10	1 0 33	1 3 47	1 7 7	1 10 34	1 14 6	1 17 42	1 21 25	1 25 15	1 29 9	1 33 8	1 37 13	1 41 24	1 45 41	1 50 4	1 54 32
11	0 59 8	1 2 17	1 5 32	1 8 53	1 12 20	1 15 51	1 19 28	1 23 11	1 26 59	1 30 53	1 34 52	1 38 56	1 43 7	1 47 22	1 51 44
12	0 57 47	1 0 51	1 4 1	1 7 17	1 10 38	1 14 4	1 17 36	1 21 13	1 24 55	1 28 44	1 32 37	1 36 34	1 40 39	1 44 47	1 49 3
13	0 56 30	0 59 29	1 2 34	1 5 45	1 9 1	1 12 22	1 15 48	1 19 20	1 22 56	1 26 40	1 30 27	1 34 18	1 38 17	1 42 19	1 46 28
14	0 55 16	0 58 11	1 1 12	1 4 17	1 7 28	1 10 44	1 14 5	1 17 31	1 21 2	1 24 40	1 28 22	1 32 7	1 36 0	1 39 56	1 43 58
15	0 54 6	0 56 57	0 59 53	1 2 53	1 5 59	1 9 10	1 12 26	1 15 46	1 19 12	1 22 44	1 26 21	1 30 0	1 33 47	1 37 38	1 41 34
16	0 52 59	0 55 46	0 58 37	1 1 33	1 4 34	1 7 40	1 10 52	1 14 6	1 17 27	1 20 51	1 24 25	1 27 59	1 31 39	1 35 24	1 39 15
17	0 51 54	0 54 37	0 57 24	1 0 16	1 3 13	1 6 14	1 9 21	1 12 30	1 15 46	1 19 5	1 22 34	1 26 3	1 29 37	1 33 17	1 37 3
18	0 50 51	0 53 30	0 56 13	0 59 1	1 1 54	1 4 51	1 7 53	1 10 58	1 14 9	1 17 23	1 20 47	1 24 12	1 27 41	1 31 16	1 34 56
19	0 49 50	0 52 25	0 55 4	0 57 48	1 0 37	1 3 30	1 6 28	1 9 29	1 12 36	1 15 45	1 19 4	1 22 25	1 25 49	1 29 19	1 32 54
20	0 48 51	0 51 22	0 53 57	0 56 37	0 59 22	1 2 11	1 5 5	1 8 3	1 11 6	1 14 13	1 17 25	1 20 41	1 24 1	1 27 26	1 30 56
21	0 47 54	0 50 21	0 52 52	0 55 29	0 58 10	1 0 55	1 3 45	1 6 39	1 9 38	1 12 42	1 15 49	1 19 0	1 22 16	1 25 36	1 29 2
22	0 46 59	0 49 22	0 51 50	0 54 23	0 57 1	0 59 42	1 2 28	1 5 18	1 8 13	1 11 13	1 14 15	1 17 22	1 20 33	1 23 49	1 27 10
23	0 46 6	0 48 26	0 50 51	0 53 20	0 55 54	0 58 32	1 1 13	1 3 59	1 6 50	1 9 45	1 12 43	1 15 46	1 18 53	1 22 5	1 25 21

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	46m	47m	48m	49m	50m	51m	52m	53m	54m	- 55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	2 38 44	2 44 55	2 51 13	2 57 37	3 4 0	3 10 36	3 17 26	3 24 15	3 31 9	3 38 11	3 45 17	3 52 31	3 59 48	4 7 12	4 14 42
1	2 33 44	2 39 43	2 45 49	2 52 1	2 58 14	3 4 38	3 11 15	3 17 51	3 24 32	3 31 22	3 38 15	3 45 15	3 52 19	3 59 31	4 6 49
2	2 28 59	2 34 47	2 40 42	2 46 43	2 52 46	2 58 59	3 5 23	3 11 47	3 18 16	3 24 54	3 31 35	3 38 23	3 45 15	3 52 14	3 59 21
3	2 24 29	2 30 6	2 35 51	2 41 41	2 47 35	2 53 37	2 59 48	3 6 1	3 12 20	3 18 47	3 25 17	3 31 53	3 38 33	3 45 21	3 52 17
4	2 20 12	2 25 39	2 31 15	2 36 55	2 42 40	2 48 32	2 54 30	3 0 33	3 6 43	3 12 59	3 19 19	3 25 44	3 32 13	3 38 50	3 45 35
5	2 16 8	2 21 27	2 26 53	2 32 24	2 38 1	2 43 43	2 49 29	2 55 23	3 1 24	3 7 29	3 13 39	3 19 54	3 26 13	3 32 40	3 39 15
6	2 12 18	2 17 29	2 22 45	2 28 7	2 33 35	2 39 8	2 44 45	2 50 30	2 56 23	3 2 19	3 8 18	3 14 23	3 20 32	3 26 49	3 33 13
7	2 8 42	2 13 45	2 18 51	2 24 4	2 29 23	2 34 48	2 40 17	2 45 53	2 51 38	2 57 25	3 3 14	3 9 10	3 15 9	3 21 16	3 27 29
8	2 5 19	2 10 14	2 15 11	2 20 15	2 25 25	2 30 42	2 36 3	2 41 31	2 47 7	2 52 45	2 58 25	3 4 12	3 10 2	3 16 0	3 22 3
9	2 2 7	2 6 54	2 11 44	2 16 40	2 21 41	2 26 49	2 32 2	2 37 22	2 42 49	2 48 18	2 53 50	2 59 28	3 5 9	3 10 58	3 16 53
10	1 59 5	2 3 44	2 8 29	2 13 18	2 18 11	2 23 10	2 28 15	2 33 26	2 38 43	2 44 3	2 49 27	2 54 56	3 0 29	3 6 10	3 11 58
11	1 56 10	2 0 42	2 5 21	2 10 2	2 14 48	2 19 41	2 24 38	2 29 41	2 34 48	2 39 59	2 45 15	2 50 35	2 56 0	3 1 33	3 7 13
12	1 53 22	1 57 47	2 2 19	2 6 53	2 11 28	2 16 19	2 21 9	2 26 4	2 31 2	2 36 5	2 41 13	2 46 25	2 51 43	2 57 8	3 2 40
13	1 50 41	1 54 59	1 59 24	2 3 51	2 8 19	2 13 3	2 17 47	2 22 35	2 27 25	2 32 21	2 37 21	2 42 26	2 47 37	2 52 55	2 58 19
14	1 48 5	1 52 17	1 56 35	2 0 56	2 5 18	2 9 54	2 14 31	2 19 12	2 23 56	2 28 46	2 33 39	2 38 37	2 43 41	2 48 52	2 54 8
15	1 45 35	1 49 41	1 53 52	1 58 7	2 2 27	2 6 52	2 11 21	2 15 55	2 20 38	2 25 18	2 30 5	2 34 57	2 39 55	2 44 59	2 50 8
16	1 43 10	1 47 10	1 51 15	1 55 25	1 59 39	2 3 59	2 8 21	2 12 49	2 17 22	2 21 59	2 26 40	2 31 25	2 36 17	2 41 13	2 46 15
17	1 40 52	1 44 46	1 48 45	1 52 50	1 56 58	2 1 12	2 5 28	2 9 50	2 14 16	2 18 47	2 23 22	2 28 0	2 32 46	2 37 35	2 42 30
18	1 38 40	1 42 29	1 46 26	1 50 21	1 54 23	1 58 38	2 2 42	2 6 58	2 11 17	2 15 42	2 20 11	2 24 43	2 29 22	2 34 5	2 38 53
19	1 36 33	1 40 17	1 44 6	1 47 57	1 51 53	1 55 56	2 0 2	2 4 12	2 8 25	2 12 44	2 17 7	2 21 33	2 26 5	2 30 42	2 35 23
20	1 34 30	1 38 9	1 41 53	1 45 40	1 49 31	1 53 27	1 57 27	2 1 31	2 5 40	2 9 53	2 14 10	2 18 30	2 22 55	2 27 25	2 32 0
21	1 32 31	1 36 5	1 39 44	1 43 25	1 47 11	1 51 2	1 54 56	1 58 55	2 2 59	2 7 6	2 11 17	2 15 31	2 19 51	2 24 15	2 28 43
22	1 30 35	1 34 4	1 37 39	1 41 14	1 44 55	1 48 41	1 52 30	1 56 24	2 0 22	2 4 23	2 8 29	2 12 38	2 16 52	2 21 10	2 25 32
23	1 28 41	1 32 5	1 35 34	1 39 6	1 42 43	1 46 24	1 50 8	1 53 56	1 57 49	2 1 45	2 5 45	2 9 49	2 13 58	2 18 10	2 22 26

LATITUDE 25° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 51	0 11 4	0 11 24	0 11 54	0 12 31	0 13 18	0 14 13	0 15 16	0 16 27	0 17 47	0 19 14	0 20 51	0 22 35	0 24 28	0 26 29
1	0 10 52	0 11 6	0 11 26	0 11 58	0 12 37	0 13 24	0 14 22	0 15 28	0 16 40	0 18 5	0 19 36	0 21 14	0 23 2	0 25 0	0 27 5
2	0 10 53	0 11 8	0 11 29	0 12 2	0 12 44	0 13 31	0 14 31	0 15 40	0 16 55	0 18 24	0 19 59	0 21 40	0 23 33	0 25 36	0 27 46
3	0 10 54	0 11 10	0 11 32	0 12 6	0 12 50	0 13 39	0 14 41	0 15 53	0 17 12	0 18 44	0 20 24	0 22 9	0 24 7	0 26 15	0 28 29
4	0 10 56	0 11 12	0 11 35	0 12 10	0 12 56	0 13 48	0 14 53	0 16 7	0 17 30	0 19 5	0 20 50	0 22 41	0 24 44	0 26 57	0 29 17
5	0 10 58	0 11 14	0 11 38	0 12 15	0 13 2	0 13 59	0 15 6	0 16 23	0 17 49	0 19 28	0 21 17	0 23 15	0 25 23	0 27 41	0 30 10
6	0 10 59	0 11 16	0 11 41	0 12 20	0 13 9	0 14 9	0 15 19	0 16 41	0 18 11	0 19 54	0 21 48	0 23 52	0 26 6	0 28 30	0 31 6
7	0 11 1	0 11 18	0 11 45	0 12 26	0 13 17	0 14 20	0 15 33	0 17 0	0 18 36	0 20 23	0 22 23	0 24 33	0 26 54	0 29 26	0 32 9
8	0 11 3	0 11 21	0 11 49	0 12 32	0 13 26	0 14 32	0 15 49	0 17 20	0 19 5	0 20 54	0 23 1	0 25 18	0 27 47	0 30 28	0 33 18
9	0 11 4	0 11 23	0 11 55	0 12 38	0 13 36	0 14 46	0 16 7	0 17 43	0 19 34	0 21 30	0 23 44	0 26 9	0 28 46	0 31 36	0 34 36
10	0 11 6	0 11 26	0 12 1	0 12 45	0 13 47	0 15 2	0 16 29	0 18 9	0 20 5	0 22 13	0 24 31	0 27 5	0 29 50	0 32 49	0 36 1
11	0 11 7	0 11 28	0 12 6	0 12 54	0 14 0	0 15 19	0 16 52	0 18 38	0 20 41	0 22 58	0 25 25	0 28 9	0 31 5	0 34 14	0 37 40
12	0 11 9	0 11 31	0 12 11	0 13 5	0 14 14	0 15 38	0 17 18	0 19 12	0 21 23	0 23 47	0 26 27	0 29 21	0 32 32	0 35 54	0 39 32
13	0 11 11	0 11 35	0 12 18	0 13 16	0 14 30	0 16 3	0 17 50	0 19 53	0 22 16	0 24 50	0 27 44	0 30 51	0 34 17	0 37 54	0 41 48
14	0 11 13	0 11 39	0 12 26	0 13 28	0 14 47	0 16 29	0 18 24	0 20 37	0 23 13	0 25 57	0 29 5	0 32 26	0 36 8	0 40 1	0 44 11
15	0 11 14	0 11 42	0 12 34	0 13 41	0 15 9	0 17 0	0 19 6	0 21 34	0 24 22	0 27 24	0 30 49	0 34 30	0 38 31	0 42 47	0 47 20
16	0 11 15	0 11 45	0 12 42	0 13 56	0 15 37	0 17 37	0 19 54	0 22 38	0 25 39	0 28 59	0 32 41	0 36 43	0 41 3	0 45 42	0 50 39
17	0 11 19	0 11 52	0 12 55	0 14 16	0 16 11	0 18 27	0 21 3	0 24 6	0 27 31	0 31 16	0 35 24	0 39 55	0 44 45	0 49 57	0 55 26
18	0 11 24	0 11 59	0 13 13	0 14 43	0 16 50	0 19 22	0 22 17	0 25 39	0 29 29	0 33 39	0 38 14	0 43 14	0 48 35	0 54 21	1 0 22
19	0 11 28	0 12 10	0 13 33	0 15 19	0 17 47	0 20 48	0 24 17	0 28 10	0 32 39	0 37 32	0 42 49	0 48 33	0 54 40	1 1 17	1 8 3
20	0 11 32	0 12 25	0 13 55	0 16 14	0 18 55	0 22 25	0 26 28	0 30 52	0 36 0	0 41 37	0 47 37	0 54 6	1 1 0	1 8 28	1 16 0
21	0 11 38	0 12 43	0 14 42	0 17 27	0 20 55	0 24 59	0 29 47	0 35 18	0 41 24	0 48 11	0 55 13	1 2 49	1 10 47	1 19 17	1 28 13
22	0 11 44	0 13 18	0 15 44	0 19 22	0 23 52	0 29 1	0 35 18	0 42 5	0 49 46	0 57 44	1 6 18	1 15 22	1 24 46	1 34 44	1 44 56
23	0 11 50	0 14 22	0 17 47	0 22 50	0 29 22	0 36 37	0 44 50	0 53 44	1 3 27	1 13 19	1 23 50	1 34 43	1 45 53	1 57 40	2 9 13

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 51	0 11 4	0 11 24	0 11 54	0 12 31	0 13 18	0 14 13	0 15 16	0 16 27	0 17 47	0 19 14	0 20 51	0 22 35	0 24 28	0 26 29
1	0 10 49	0 11 2	0 11 21	0 11 50	0 12 26	0 13 12	0 14 4	0 15 6	0 16 14	0 17 31	0 18 56	0 20 28	0 22 8	0 23 58	0 25 54
2	0 10 48	0 11 0	0 11 18	0 11 46	0 12 22	0 13 6	0 13 56	0 14 56	0 16 2	0 17 16	0 18 38	0 20 7	0 21 43	0 23 29	0 25 21
3	0 10 47	0 10 58	0 11 16	0 11 42	0 12 18	0 13 0	0 13 48	0 14 46	0 15 50	0 17 1	0 18 21	0 19 47	0 21 20	0 23 2	0 24 51
4	0 10 46	0 10 56	0 11 14	0 11 39	0 12 14	0 12 54	0 13 40	0 14 36	0 15 38	0 16 47	0 18 5	0 19 28	0 20 58	0 22 37	0 24 23
5	0 10 45	0 10 55	0 11 12	0 11 36	0 12 10	0 12 49	0 13 33	0 14 27	0 15 27	0 16 34	0 17 50	0 19 10	0 20 37	0 22 13	0 23 56
6	0 10 44	0 10 53	0 11 9	0 11 33	0 12 6	0 12 43	0 13 26	0 14 18	0 15 17	0 16 22	0 17 35	0 18 53	0 20 17	0 21 50	0 23 30
7	0 10 42	0 10 51	0 11 6	0 11 30	0 12 2	0 12 37	0 13 20	0 14 10	0 15 7	0 16 10	0 17 21	0 18 37	0 19 59	0 21 29	0 23 5
8	0 10 40	0 10 49	0 11 4	0 11 27	0 11 58	0 12 32	0 13 14	0 14 2	0 14 58	0 15 59	0 17 7	0 18 21	0 19 41	0 21 8	0 22 42
9	0 10 38	0 10 47	0 11 2	0 11 24	0 11 54	0 12 27	0 13 8	0 13 55	0 14 49	0 15 49	0 16 54	0 18 6	0 19 24	0 20 48	0 22 20
10	0 10 36	0 10 45	0 11 0	0 11 21	0 11 50	0 12 22	0 13 2	0 13 48	0 14 40	0 15 39	0 16 42	0 17 52	0 19 8	0 20 29	0 21 59
11	0 10 35	0 10 43	0 10 57	0 11 17	0 11 46	0 12 17	0 12 56	0 13 41	0 14 32	0 15 29	0 16 31	0 17 38	0 18 52	0 20 11	0 21 38
12	0 10 33	0 10 41	0 10 54	0 11 14	0 11 42	0 12 12	0 12 50	0 13 34	0 14 24	0 15 19	0 16 20	0 17 25	0 18 37	0 19 54	0 21 18
13	0 10 31	0 10 39	0 10 51	0 11 11	0 11 38	0 12 7	0 12 44	0 13 27	0 14 16	0 15 9	0 16 10	0 17 12	0 18 23	0 19 38	0 20 59
14	0 10 29	0 10 37	0 10 48	0 11 8	0 11 34	0 12 3	0 12 39	0 13 21	0 14 8	0 15 0	0 16 0	0 17 0	0 18 9	0 19 22	0 20 41
15	0 10 27	0 10 35	0 10 45	0 11 5	0 11 30	0 11 59	0 12 34	0 13 15	0 14 1	0 14 51	0 15 51	0 16 48	0 17 55	0 19 7	0 20 24
16	0 10 25	0 10 33	0 10 43	0 11 2	0 11 26	0 11 55	0 12 29	0 13 9	0 13 54	0 14 42	0 15 42	0 16 37	0 17 42	0 18 52	0 20 7
17	0 10 23	0 10 31	0 10 41	0 10 59	0 11 22	0 11 51	0 12 24	0 13 3	0 13 47	0 14 34	0 15 33	0 16 26	0 17 29	0 18 37	0 19 51
18	0 10 21	0 10 29	0 10 39	0 10 56	0 11 18	0 11 47	0 12 19	0 12 57	0 13 40	0 14 26	0 15 24	0 16 15	0 17 17	0 18 23	0 19 35
19	0 10 19	0 10 27	0 10 37	0 10 53	0 11 15	0 11 43	0 12 14	0 12 51	0 13 33	0 14 18	0 15 16	0 16 4	0 17 5	0 18 10	0 19 20
20	0 10 17	0 10 24	0 10 35	0 10 51	0 11 12	0 11 39	0 12 9	0 12 45	0 13 26	0 14 10	0 15 8	0 15 54	0 16 53	0 17 57	0 19 5
21	0 10 15	0 10 21	0 10 32	0 10 48	0 11 8	0 11 35	0 12 4	0 12 39	0 13 19	0 14 2	0 14 57	0 15 44	0 16 41	0 17 44	0 18 50
22	0 10 13	0 10 19	0 10 30	0 10 45	0 11 5	0 11 31	0 11 59	0 12 34	0 13 12	0 13 55	0 14 46	0 15 34	0 16 30	0 17 32	0 18 36
23	0 10 10	0 10 17	0 10 28	0 10 42	0 11 2	0 11 27	0 11 55	0 12 29	0 13 6	0 13 48	0 14 35	0 15 25	0 16 20	0 17 20	0 18 23

LATITUDE 25° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 28 38	0 30 56	0 33 21	0 35 54	0 38 36	0 41 25	0 44 22	0 47 28	0 50 41	0 54 1	0 57 30	1 1 6	1 4 49	1 8 41	1 12 39
1	0 29 20	0 31 45	0 34 14	0 36 52	0 39 39	0 42 35	0 45 39	0 48 53	0 52 12	0 55 41	0 59 17	1 2 58	1 6 50	1 10 51	1 14 59
2	0 30 6	0 32 37	0 35 11	0 37 54	0 40 48	0 43 52	0 47 3	0 50 24	0 53 49	0 57 27	1 1 10	1 5 1	1 9 3	1 13 12	1 17 28
3	0 30 54	0 33 32	0 36 13	0 39 3	0 42 4	0 45 15	0 48 34	0 52 2	0 55 36	0 59 22	1 3 14	1 7 15	1 11 28	1 15 41	1 20 9
4	0 31 47	0 34 31	0 37 20	0 40 18	0 43 26	0 46 45	0 50 13	0 53 48	0 57 32	1 1 27	1 5 29	1 9 40	1 14 5	1 18 25	1 23 4
5	0 32 46	0 35 35	0 38 32	0 41 40	0 44 56	0 48 22	0 52 0	0 55 44	0 59 38	1 3 42	1 7 56	1 12 17	1 16 45	1 21 25	1 26 16
6	0 33 50	0 36 46	0 39 51	0 43 9	0 46 34	0 50 9	0 53 57	0 57 52	1 1 57	1 6 11	1 10 37	1 15 9	1 19 49	1 24 41	1 29 45
7	0 35 1	0 38 5	0 41 20	0 44 47	0 48 22	0 52 8	0 56 6	1 0 12	1 4 29	1 8 54	1 13 32	1 18 17	1 23 10	1 28 15	1 33 32
8	0 36 20	0 39 35	0 43 1	0 46 36	0 50 21	0 54 18	0 58 29	1 2 47	1 7 16	1 11 52	1 16 42	1 21 43	1 26 51	1 32 11	1 37 39
9	0 37 48	0 41 15	0 44 50	0 48 38	0 52 36	0 56 47	1 1 11	1 5 43	1 10 24	1 15 16	1 20 23	1 25 38	1 31 3	1 36 38	1 42 23
10	0 39 26	0 43 5	0 46 49	0 50 50	0 55 1	0 59 27	1 4 4	1 8 51	1 13 45	1 18 53	1 24 17	1 29 47	1 35 29	1 41 20	1 47 23
11	0 41 16	0 45 9	0 49 9	0 53 25	0 57 53	1 2 35	1 7 29	1 12 23	1 17 46	1 23 11	1 28 52	1 34 41	1 40 43	1 46 54	1 53 17
12	0 43 21	0 47 27	0 51 44	0 56 15	1 1 0	1 5 58	1 11 10	1 16 12	1 22 4	1 27 47	1 33 46	1 39 55	1 46 18	1 52 49	1 59 33
13	0 45 55	0 50 19	0 54 56	0 59 47	1 4 52	1 10 9	1 15 42	1 21 16	1 27 21	1 33 30	1 39 52	1 46 25	1 53 10	2 0 5	2 7 13
14	0 48 37	0 53 19	0 58 16	1 3 27	1 8 53	1 14 30	1 20 25	1 26 32	1 32 50	1 39 25	1 46 11	1 53 9	2 0 17	2 7 36	2 15 9
15	0 52 10	0 57 18	1 2 39	1 8 17	1 14 9	1 20 16	1 26 38	1 33 15	1 40 2	1 47 5	1 54 22	2 1 49	2 9 25	2 17 16	2 25 16
16	0 55 53	1 1 27	1 7 13	1 13 19	1 19 38	1 26 15	1 33 4	1 40 12	1 47 29	1 55 0	2 2 49	2 10 45	2 18 49	2 27 12	2 35 40
17	1 1 13	1 7 19	1 13 44	1 20 12	1 27 8	1 34 20	1 41 50	1 49 33	1 57 29	2 5 36	2 14 1	2 22 37	2 31 20	2 40 18	2 49 23
18	1 6 43	1 13 22	1 20 27	1 27 42	1 35 15	1 43 3	1 51 15	1 59 34	2 8 9	2 16 12	2 25 54	2 35 11	2 44 34	2 54 7	3 3 50
19	1 15 14	1 22 47	1 30 42	1 38 10	1 46 37	1 55 15	2 4 12	2 13 20	2 22 42	2 31 16	2 41 2	2 51 4	3 1 10	3 11 24	3 21 52
20	1 24 2	1 32 29	1 41 15	1 50 13	1 59 34	2 9 2	2 18 45	2 28 42	2 38 52	2 49 18	2 59 51	3 10 39	3 21 29	3 32 24	3 43 37
21	1 37 20	1 46 47	1 56 40	2 6 42	2 16 56	2 27 30	2 38 16	2 49 7	3 0 14	3 11 29	2 22 49	3 34 27	3 46 2	3 57 52	4 9 44
22	1 55 31	2 6 12	2 17 16	2 28 30	2 39 54	2 51 30	3 3 16	3 15 0	3 27 12	3 39 15	3 51 25	4 3 48	4 16 15	4 28 41	4 41 13
23	2 20 57	2 33 4	2 45 35	2 57 49	3 10 25	3 22 53	3 35 42	3 48 26	4 1 17	4 14 0	4 27 0	4 40 9	4 52 11	5 6 13	5 19 19

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 28 38	0 30 56	0 33 21	0 35 54	0 38 36	0 41 25	0 44 22	0 47 28	0 50 41	0 54 1	0 57 30	1 1 6	1 4 49	1 8 41	1 12 39
1	0 27 58	0 30 12	0 32 31	0 35 0	0 37 36	0 40 19	0 43 4	0 46 10	0 49 17	0 52 30	0 55 52	0 59 20	1 2 55	1 6 39	1 10 31
2	0 27 21	0 29 30	0 31 45	0 34 9	0 36 40	0 39 17	0 42 4	0 44 57	0 47 58	0 51 5	0 54 21	0 57 41	1 1 9	1 4 45	1 8 29
3	0 26 47	0 28 51	0 31 2	0 33 21	0 35 47	0 38 19	0 41 1	0 43 48	0 46 43	0 49 44	0 52 54	0 56 7	0 59 29	1 2 58	1 6 36
4	0 26 15	0 28 15	0 30 22	0 32 36	0 34 57	0 37 24	0 40 1	0 42 43	0 45 32	0 48 27	0 51 31	0 54 39	0 57 55	1 1 17	1 4 49
5	0 25 45	0 27 41	0 29 44	0 31 54	0 34 10	0 36 32	0 39 4	0 41 41	0 44 24	0 47 14	0 50 12	0 53 16	0 56 26	0 59 42	1 3 8
6	0 25 15	0 27 8	0 29 7	0 31 13	0 33 25	0 35 43	0 38 10	0 40 42	0 43 20	0 46 5	0 48 57	0 51 57	0 55 2	0 58 11	1 1 31
7	0 24 47	0 26 37	0 28 32	0 30 34	0 32 42	0 34 57	0 37 20	0 39 47	0 42 20	0 45 0	0 47 47	0 50 42	0 53 42	0 56 45	0 59 59
8	0 24 21	0 26 8	0 27 59	0 29 57	0 32 1	0 34 13	0 36 32	0 38 55	0 41 24	0 43 59	0 46 41	0 49 31	0 52 26	0 55 24	0 58 32
9	0 23 56	0 25 40	0 27 28	0 29 23	0 31 23	0 33 32	0 35 47	0 38 6	0 40 31	0 43 2	0 45 39	0 48 24	0 51 14	0 54 8	0 57 10
10	0 23 32	0 25 14	0 26 59	0 28 51	0 30 48	0 32 53	0 35 4	0 37 19	0 39 40	0 42 8	0 44 41	0 47 21	0 50 6	0 52 57	0 55 53
11	0 23 9	0 24 48	0 26 31	0 28 20	0 30 13	0 32 16	0 34 23	0 36 34	0 38 52	0 41 16	0 43 45	0 46 21	0 49 2	0 51 49	0 54 40
12	0 22 47	0 24 23	0 26 4	0 27 50	0 29 40	0 31 40	0 33 44	0 35 52	0 38 7	0 40 27	0 42 52	0 45 24	0 48 1	0 50 44	0 53 30
13	0 22 26	0 23 59	0 25 38	0 27 21	0 29 8	0 31 5	0 33 7	0 35 12	0 37 24	0 39 40	0 42 1	0 44 29	0 47 2	0 49 41	0 52 22
14	0 22 6	0 23 36	0 25 13	0 26 53	0 28 38	0 30 32	0 32 31	0 34 33	0 36 41	0 38 54	0 41 12	0 43 36	0 46 5	0 48 40	0 51 17
15	0 21 47	0 23 14	0 24 49	0 26 26	0 28 9	0 30 0	0 31 56	0 33 55	0 36 0	0 38 10	0 40 25	0 42 45	0 45 10	0 47 41	0 50 14
16	0 21 28	0 22 53	0 24 26	0 26 0	0 27 41	0 29 29	0 31 22	0 33 18	0 35 20	0 37 27	0 39 39	0 41 55	0 44 17	0 46 44	0 49 13
17	0 21 10	0 22 33	0 24 3	0 25 35	0 27 13	0 28 59	0 30 49	0 32 42	0 34 41	0 36 45	0 38 54	0 41 7	0 43 25	0 45 49	0 48 14
18	0 20 52	0 22 13	0 23 41	0 25 11	0 26 46	0 28 30	0 30 17	0 32 7	0 34 3	0 36 4	0 38 10	0 40 20	0 42 35	0 44 55	0 47 17
19	0 20 35	0 21 54	0 23 19	0 24 48	0 26 20	0 28 1	0 29 46	0 31 33	0 33 26	0 35 24	0 37 27	0 39 34	0 41 46	0 44 2	0 46 22
20	0 20 18	0 21 35	0 22 58	0 24 25	0 25 57	0 27 33	0 29 15	0 31 0	0 32 50	0 34 45	0 36 45	0 38 49	0 40 58	0 43 10	0 45 28
21	0 20 2	0 21 17	0 22 38	0 24 3	0 25 33	0 27 7	0 28 46	0 30 29	0 32 16	0 34 8	0 36 5	0 38 6	0 40 12	0 42 21	0 44 36
22	0 19 46	0 21 0	0 22 19	0 23 42	0 25 10	0 26 42	0 28 18	0 29 59	0 31 44	0 33 33	0 35 27	0 37 26	0 39 28	0 41 35	0 43 46
23	0 19 31	0 20 43	0 22 0	0 23 22	0 24 47	0 26 17	0 27 51	0 29 30	0 31 13	0 32 59	0 34 51	0 36 48	0 38 47	0 40 51	0 42 59

LATITUDE 25° NORTH OR SOUTH.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 16 46	1 21 0	1 25 21	1 29 49	1 34 25	1 39 7	1 43 56	1 48 54	1 53 57	1 59 9	2 4 25	2 9 50	2 15 21	2 20 58	2 26 43
1	1 14 29	1 18 35	1 22 48	1 27 8	1 31 36	1 36 10	1 40 50	1 45 38	1 50 32	1 55 33	2 0 40	2 5 55	2 11 17	2 16 37	2 22 12
2	1 12 20	1 16 18	1 20 23	1 24 35	1 28 55	1 33 21	1 37 53	1 42 32	1 47 17	1 52 8	1 57 6	2 2 12	2 7 24	2 12 32	2 17 57
3	1 10 19	1 14 9	1 18 6	1 22 10	1 26 22	1 30 40	1 35 4	1 39 35	1 44 11	1 48 53	1 53 42	1 58 39	2 3 42	2 8 41	2 13 56
4	1 8 25	1 12 7	1 15 57	1 19 53	1 23 57	1 28 7	1 32 23	1 36 46	1 41 14	1 45 47	1 50 28	1 55 16	2 0 10	2 5 4	2 10 9
5	1 6 37	1 10 12	1 13 55	1 17 44	1 21 40	1 25 42	1 29 50	1 34 5	1 38 25	1 42 51	1 47 24	1 52 3	1 56 48	2 1 39	2 6 35
6	1 4 54	1 8 23	1 12 0	1 15 42	1 19 31	1 23 26	1 27 27	1 31 34	1 35 47	1 40 4	1 44 30	1 49 1	1 53 38	1 58 25	2 3 13
7	1 3 16	1 6 40	1 10 11	1 13 47	1 17 29	1 21 17	1 25 12	1 29 12	1 33 18	1 37 27	1 41 46	1 46 10	1 50 40	1 55 20	2 0 1
8	1 1 44	1 5 2	1 8 27	1 11 58	1 15 34	1 19 15	1 23 4	1 26 58	1 30 58	1 35 0	1 39 12	1 43 29	1 47 52	1 52 24	1 56 58
9	1 0 17	1 3 30	1 6 49	1 10 15	1 13 45	1 17 20	1 21 3	1 24 50	1 28 44	1 32 41	1 36 46	1 40 56	1 45 12	1 49 36	1 54 3
10	0 58 55	1 2 3	1 5 17	1 8 38	1 12 2	1 15 31	1 19 8	1 22 49	1 26 37	1 30 30	1 34 28	1 38 31	1 42 40	1 46 55	1 51 15
11	0 57 38	1 0 39	1 3 49	1 7 4	1 10 23	1 13 46	1 17 17	1 20 56	1 24 34	1 28 21	1 32 14	1 36 12	1 40 15	1 44 22	1 48 36
12	0 54 24	0 59 19	1 2 24	1 5 34	1 8 48	1 12 6	1 15 31	1 19 1	1 22 37	1 26 18	1 30 6	1 33 58	1 37 55	1 41 56	1 46 4
13	0 53 12	0 58 2	1 1 2	1 4 7	1 7 16	1 10 30	1 13 50	1 17 15	1 20 46	1 24 22	1 28 3	1 31 49	1 35 40	1 39 36	1 43 38
14	0 52 3	0 56 48	0 59 43	1 2 43	1 5 48	1 8 58	1 12 13	1 15 33	1 18 59	1 22 30	1 26 5	1 29 45	1 33 30	1 37 21	1 41 17
15	0 50 56	0 55 37	0 58 27	1 1 22	1 4 23	1 7 29	1 10 39	1 13 54	1 17 15	1 20 41	1 24 11	1 27 46	1 31 26	1 35 10	1 39 0
16	0 49 51	0 54 28	0 57 14	1 0 5	1 3 2	1 6 3	1 9 8	1 12 19	1 15 35	1 18 56	1 22 21	1 25 51	1 29 26	1 33 4	1 36 48
17	0 48 48	0 53 22	0 56 4	0 58 51	1 1 44	1 4 41	1 7 42	1 10 48	1 13 59	1 17 15	1 20 35	1 24 0	1 27 30	1 31 3	1 34 42
18	0 47 47	0 52 18	0 54 56	0 57 39	1 0 28	1 3 21	1 6 18	1 9 20	1 12 27	1 15 38	1 18 53	1 22 13	1 25 39	1 29 7	1 32 41
19	0 46 48	0 51 17	0 53 51	0 56 30	0 59 15	1 2 4	1 4 57	1 7 55	1 10 58	1 14 5	1 17 16	1 20 31	1 23 52	1 27 16	1 30 45
20	0 47 51	0 50 18	0 52 49	0 55 24	0 58 5	1 0 50	1 3 39	1 6 33	1 9 32	1 12 35	1 15 42	1 18 53	1 22 9	1 25 29	1 28 53
21	0 46 56	0 49 21	0 51 48	0 54 20	0 56 57	0 59 38	1 2 23	1 5 14	1 8 9	1 11 8	1 14 10	1 17 17	1 20 29	1 23 45	1 27 4
22	0 46 3	0 48 25	0 50 49	0 53 18	0 55 51	0 58 28	1 1 10	1 3 57	1 6 48	1 9 43	1 12 41	1 15 43	1 18 51	1 22 3	1 25 18
23	0 45 13	0 47 31	0 49 52	0 52 18	0 54 48	0 57 21	0 59 59	1 2 42	1 5 29	1 8 20	1 11 14	1 14 12	1 17 16	1 20 24	1 23 35

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	2 32 33	2 38 30	2 44 33	2 50 43	2 56 59	3 3 21	3 9 49	3 16 23	3 23 2	3 29 49	3 36 41	3 43 38	3 50 40	3 57 50	4 5 3
1	2 27 54	2 33 40	2 39 32	2 45 32	2 51 38	2 57 49	3 4 5	3 10 30	3 16 55	3 23 30	3 30 10	3 36 56	3 43 48	3 50 47	3 57 47
2	2 23 29	2 29 5	2 34 47	2 40 37	2 46 33	2 52 33	2 58 38	3 4 54	3 11 6	3 17 30	3 23 58	3 30 34	3 37 16	3 44 3	3 50 51
3	2 19 18	2 24 45	2 30 18	2 35 58	2 41 43	2 47 33	2 53 28	2 59 36	3 5 35	3 11 48	3 18 5	3 24 31	3 31 3	3 37 38	3 44 15
4	2 15 21	2 20 39	2 26 3	2 31 33	2 37 8	2 42 48	2 48 33	2 54 33	3 0 21	3 6 23	3 12 30	3 18 46	3 25 8	3 31 32	3 37 58
5	2 11 37	2 16 46	2 22 1	2 27 21	2 32 47	2 38 18	2 43 53	2 49 45	2 55 23	3 1 15	3 7 12	3 13 18	3 19 30	3 25 43	3 31 58
6	2 8 5	2 13 6	2 18 12	2 23 23	2 28 40	2 34 1	2 39 27	2 45 9	2 50 40	2 56 24	3 2 11	3 8 8	3 14 10	3 20 14	3 26 21
7	2 4 44	2 9 37	2 14 35	2 19 38	2 24 46	2 29 57	2 35 15	2 40 47	2 46 12	2 51 48	2 57 26	3 3 13	3 9 6	3 15 2	3 21 2
8	2 1 33	2 6 18	2 11 8	2 16 4	2 21 4	2 26 6	2 31 16	2 36 38	2 41 57	2 47 25	2 52 54	2 58 32	3 4 16	3 10 4	3 15 57
9	1 58 32	2 3 9	2 7 52	2 12 40	2 17 32	2 22 28	2 27 31	2 32 43	2 37 58	2 43 15	2 48 36	2 54 5	2 59 40	3 5 20	3 11 6
10	1 55 40	2 0 10	2 4 46	2 9 27	2 14 11	2 19 1	2 23 58	2 29 0	2 34 7	2 39 18	2 44 32	2 49 52	2 55 18	3 0 50	3 6 29
11	1 52 56	1 57 20	2 1 49	2 6 23	2 11 0	2 15 43	2 20 33	2 25 28	2 30 26	2 35 30	2 40 37	2 45 50	2 51 7	2 56 31	3 2 2
12	1 50 18	1 54 36	1 58 58	2 3 25	2 7 56	2 12 32	2 17 15	2 22 3	2 26 53	2 31 50	2 36 50	2 41 56	2 47 5	2 52 21	2 57 44
13	1 47 45	1 51 57	1 56 13	2 0 33	2 4 58	2 9 28	2 14 4	2 18 45	2 23 28	2 28 18	2 33 11	2 38 10	2 43 12	2 48 20	2 53 35
14	1 45 17	1 49 23	1 53 33	1 57 47	2 2 6	2 6 30	2 10 59	2 15 34	2 20 10	2 24 53	2 29 39	2 34 31	2 39 27	2 44 28	2 49 35
15	1 42 54	1 46 54	1 50 58	1 55 7	1 59 20	2 3 38	2 8 0	2 12 29	2 16 59	2 21 35	2 26 14	2 30 59	2 35 50	2 40 44	2 45 43
16	1 40 37	1 44 31	1 48 30	1 52 34	1 56 41	2 0 53	2 5 8	2 9 31	2 13 55	2 18 25	2 22 58	2 27 35	2 32 20	2 37 8	2 42 1
17	1 38 26	1 42 15	1 46 8	1 50 7	1 54 8	1 58 14	2 2 23	2 6 40	2 10 58	2 15 22	2 19 50	2 24 20	2 28 59	2 33 41	2 38 28
18	1 36 20	1 40 4	1 43 52	1 47 45	1 51 41	1 55 41	1 59 45	2 3 56	2 8 9	2 12 27	2 16 49	2 21 13	2 25 46	2 30 22	2 35 3
19	1 34 19	1 37 58	1 41 41	1 45 28	1 49 19	1 53 14	1 57 13	2 1 18	2 5 26	2 9 38	2 13 54	2 18 13	2 22 40	2 27 10	2 31 45
20	1 32 22	1 35 56	1 39 34	1 43 16	1 47 2	1 50 52	1 54 46	1 58 45	2 2 48	2 6 54	2 11 4	2 15 19	2 19 40	2 24 4	2 28 33
21	1 30 29	1 33 58	1 37 31	1 41 8	1 44 49	1 48 34	1 52 23	1 56 17	2 0 15	2 4 16	2 8 21	2 12 31	2 16 46	2 21 4	2 25 26
22	1 28 38	1 32 2	1 35 30	1 39 3	1 42 40	1 46 20	1 50 4	1 53 53	1 57 46	2 1 42	2 5 42	2 9 47	2 13 56	2 18 8	2 22 24
23	1 26 50	1 30 9	1 33 32	1 37 0	1 40 33	1 44 9	1 47 48	1 51 31	1 55 19	1 59 10	2 3 5	2 7 5	2 11 9	2 15 16	2 19 25

LATITUDE 26° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 50	0 11 2	0 11 22	0 11 51	0 12 27	0 13 11	0 14 3	0 15 3	0 16 12	0 17 29	0 18 52	0 20 25	0 22 4	0 23 52	0 25 48
1	0 10 51	0 11 4	0 11 24	0 11 54	0 12 31	0 13 17	0 14 11	0 15 14	0 16 26	0 17 45	0 19 11	0 20 47	0 22 31	0 24 22	0 26 22
2	0 10 53	0 11 6	0 11 27	0 11 57	0 12 36	0 13 24	0 14 20	0 15 25	0 16 40	0 18 1	0 19 31	0 21 10	0 22 59	0 24 54	0 26 59
3	0 10 54	0 11 8	0 11 29	0 12 1	0 12 42	0 13 31	0 14 30	0 15 37	0 16 55	0 18 19	0 19 52	0 21 35	0 23 28	0 25 28	0 27 38
4	0 10 55	0 11 10	0 11 31	0 12 5	0 12 49	0 13 38	0 14 41	0 15 50	0 17 11	0 18 39	0 20 15	0 22 3	0 24 0	0 26 5	0 28 21
5	0 10 57	0 11 12	0 11 34	0 12 10	0 12 56	0 13 46	0 14 52	0 16 4	0 17 28	0 19 2	0 20 41	0 22 33	0 24 36	0 26 46	0 29 8
6	0 10 58	0 11 14	0 11 37	0 12 15	0 13 3	0 13 56	0 15 4	0 16 20	0 17 47	0 19 25	0 21 10	0 23 6	0 25 15	0 27 31	0 29 59
7	0 11 0	0 11 16	0 11 41	0 12 20	0 13 10	0 14 7	0 15 17	0 16 37	0 18 8	0 19 50	0 21 41	0 23 43	0 25 58	0 28 21	0 30 54
8	0 11 2	0 11 18	0 11 45	0 12 25	0 13 18	0 14 20	0 15 31	0 16 56	0 18 31	0 20 18	0 22 16	0 24 24	0 26 45	0 29 15	0 31 54
9	0 11 3	0 11 20	0 11 48	0 12 31	0 13 26	0 14 32	0 15 47	0 17 16	0 18 57	0 20 50	0 22 54	0 25 9	0 27 37	0 30 15	0 33 2
10	0 11 4	0 11 23	0 11 52	0 12 38	0 13 34	0 14 44	0 16 6	0 17 38	0 19 26	0 21 25	0 23 35	0 25 58	0 28 33	0 31 22	0 34 20
11	0 11 5	0 11 25	0 11 58	0 12 44	0 13 44	0 14 59	0 16 25	0 18 4	0 19 59	0 22 4	0 24 23	0 26 53	0 29 38	0 32 37	0 35 46
12	0 11 7	0 11 28	0 12 4	0 12 51	0 13 55	0 15 16	0 16 45	0 18 33	0 20 35	0 22 48	0 25 17	0 27 55	0 30 53	0 34 2	0 37 21
13	0 11 8	0 11 31	0 12 10	0 13 1	0 14 9	0 15 34	0 17 10	0 19 6	0 21 16	0 23 38	0 26 17	0 29 7	0 32 14	0 35 35	0 39 7
14	0 11 10	0 11 34	0 12 16	0 13 14	0 14 26	0 15 55	0 17 41	0 19 44	0 22 4	0 24 36	0 27 26	0 30 32	0 33 51	0 37 27	0 41 17
15	0 11 13	0 11 38	0 12 24	0 13 26	0 14 46	0 16 21	0 18 17	0 20 29	0 22 59	0 25 45	0 28 48	0 32 7	0 35 42	0 39 34	0 43 41
16	0 11 17	0 11 43	0 12 32	0 13 39	0 15 10	0 16 52	0 18 57	0 21 23	0 24 7	0 27 8	0 30 27	0 34 2	0 37 58	0 42 11	0 46 39
17	0 11 19	0 11 47	0 12 42	0 13 56	0 15 36	0 17 30	0 19 47	0 22 28	0 25 32	0 28 50	0 32 27	0 36 22	0 40 38	0 45 16	0 50 7
18	0 11 21	0 11 52	0 12 52	0 14 18	0 16 7	0 18 17	0 20 48	0 23 45	0 27 11	0 30 49	0 34 49	0 39 14	0 43 56	0 49 7	0 54 24
19	0 11 24	0 12 2	0 13 9	0 14 47	0 16 50	0 19 17	0 22 8	0 25 25	0 29 11	0 33 19	0 37 53	0 42 48	0 48 0	0 53 43	0 59 38
20	0 11 28	0 12 12	0 13 30	0 15 20	0 17 44	0 20 33	0 23 47	0 27 40	0 31 54	0 36 44	0 41 49	0 47 24	0 53 20	0 59 47	1 6 28
21	0 11 30	0 12 25	0 13 52	0 15 59	0 18 55	0 22 16	0 26 11	0 30 40	0 35 43	0 41 10	0 47 2	0 53 34	1 0 21	1 7 39	1 15 11
22	0 11 36	0 12 43	0 14 38	0 17 18	0 20 43	0 24 45	0 29 38	0 34 55	0 40 57	0 47 38	0 54 40	1 2 2	1 10 2	1 18 26	1 27 0
23	0 11 42	0 13 14	0 15 42	0 19 12	0 23 39	0 28 55	0 34 49	0 41 42	0 49 14	0 57 1	1 5 36	1 14 31	1 23 46	1 33 39	1 43 46

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 50	0 11 2	0 11 22	0 11 51	0 12 27	0 13 11	0 14 3	0 15 3	0 16 12	0 17 29	0 18 52	0 20 25	0 22 4	0 23 52	0 25 48
1	0 10 49	0 11 0	0 11 19	0 11 47	0 12 22	0 13 5	0 13 55	0 14 53	0 16 0	0 17 15	0 18 35	0 20 4	0 21 41	0 23 25	0 25 16
2	0 10 48	0 10 58	0 11 16	0 11 43	0 12 17	0 12 59	0 13 47	0 14 44	0 15 48	0 17 1	0 18 19	0 19 44	0 21 18	0 22 59	0 24 46
3	0 10 46	0 10 56	0 11 13	0 11 39	0 12 12	0 12 53	0 13 40	0 14 35	0 15 37	0 16 47	0 18 3	0 19 25	0 20 56	0 22 34	0 24 18
4	0 10 44	0 10 54	0 11 11	0 11 36	0 12 8	0 12 47	0 13 33	0 14 26	0 15 26	0 16 33	0 17 47	0 19 7	0 20 35	0 22 10	0 23 51
5	0 10 42	0 10 52	0 11 9	0 11 33	0 12 4	0 12 41	0 13 26	0 14 17	0 15 15	0 16 20	0 17 31	0 18 50	0 20 15	0 21 47	0 23 25
6	0 10 41	0 10 50	0 11 6	0 11 30	0 12 0	0 12 36	0 13 19	0 14 9	0 15 6	0 16 8	0 17 17	0 18 34	0 19 56	0 21 25	0 23 0
7	0 10 39	0 10 48	0 11 3	0 11 27	0 11 56	0 12 31	0 13 13	0 14 1	0 14 57	0 15 57	0 17 4	0 18 18	0 19 38	0 21 4	0 22 37
8	0 10 37	0 10 46	0 11 1	0 11 24	0 11 52	0 12 26	0 13 7	0 13 54	0 14 48	0 15 46	0 16 52	0 18 3	0 19 21	0 20 45	0 22 15
9	0 10 35	0 10 44	0 10 59	0 11 21	0 11 48	0 12 21	0 13 1	0 13 47	0 14 39	0 15 36	0 16 40	0 17 49	0 19 5	0 20 27	0 21 55
10	0 10 33	0 10 42	0 10 57	0 11 18	0 11 44	0 12 17	0 12 55	0 13 40	0 14 30	0 15 26	0 16 28	0 17 36	0 18 50	0 20 10	0 21 36
11	0 10 32	0 10 40	0 10 55	0 11 15	0 11 40	0 12 13	0 12 50	0 13 33	0 14 22	0 15 17	0 16 17	0 17 24	0 18 36	0 19 54	0 21 18
12	0 10 30	0 10 38	0 10 53	0 11 12	0 11 36	0 12 9	0 12 45	0 13 27	0 14 14	0 15 8	0 16 6	0 17 12	0 18 22	0 19 38	0 21 0
13	0 10 28	0 10 36	0 10 51	0 11 9	0 11 32	0 12 5	0 12 40	0 13 21	0 14 7	0 14 59	0 15 56	0 17 1	0 18 9	0 19 23	0 20 43
14	0 10 26	0 10 34	0 10 49	0 11 6	0 11 28	0 12 1	0 12 35	0 13 15	0 14 0	0 14 50	0 15 46	0 16 50	0 17 56	0 19 8	0 20 26
15	0 10 24	0 10 32	0 10 47	0 11 3	0 11 24	0 11 57	0 12 30	0 13 9	0 13 53	0 14 42	0 15 36	0 16 39	0 17 43	0 18 53	0 20 9
16	0 10 22	0 10 30	0 10 44	0 11 0	0 11 21	0 11 53	0 12 25	0 13 3	0 13 46	0 14 34	0 15 27	0 16 28	0 17 30	0 18 38	0 19 52
17	0 10 20	0 10 28	0 10 41	0 10 57	0 11 18	0 11 49	0 12 20	0 12 57	0 13 39	0 14 26	0 15 18	0 16 17	0 17 17	0 18 23	0 19 36
18	0 10 18	0 10 26	0 10 38	0 10 54	0 11 15	0 11 45	0 12 15	0 12 51	0 13 32	0 14 18	0 15 9	0 16 6	0 17 5	0 18 9	0 19 20
19	0 10 16	0 10 24	0 10 35	0 10 51	0 11 12	0 11 40	0 12 10	0 12 45	0 13 25	0 14 10	0 15 0	0 15 55	0 16 53	0 17 56	0 19 5
20	0 10 14	0 10 21	0 10 32	0 10 48	0 11 9	0 11 35	0 12 5	0 12 39	0 13 18	0 14 2	0 14 51	0 15 44	0 16 41	0 17 43	0 18 50
21	0 10 12	0 10 19	0 10 30	0 10 45	0 11 6	0 11 30	0 12 0	0 12 33	0 13 11	0 13 54	0 14 42	0 15 34	0 16 30	0 17 30	0 18 36
22	0 10 10	0 10 16	0 10 27	0 10 42	0 11 2	0 11 26	0 11 55	0 12 27	0 13 5	0 13 47	0 14 33	0 15 24	0 16 19	0 17 18	0 18 22
23	0 10 7	0 10 13	0 10 24	0 10 39	0 10 58	0 11 22	0 11 50	0 12 22	0 12 59	0 13 40	0 14 25	0 15 14	0 16 8	0 17 6	0 18 9

LATITUDE 26° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 27 51	0 30 2	0 32 22	0 34 48	0 37 23	0 40 5	0 42 55	0 45 53	0 48 57	0 52 10	0 55 29	0 58 56	1 2 30	1 6 12	1 10 1
1	0 28 30	0 30 47	0 33 12	0 35 42	0 38 22	0 41 10	0 44 6	0 47 11	0 50 21	0 53 40	0 57 7	1 0 42	1 4 23	1 8 12	1 12 9
2	0 29 11	0 31 34	0 34 4	0 36 40	0 39 25	0 42 20	0 45 23	0 48 34	0 51 51	0 55 17	0 58 53	1 2 35	1 6 24	1 10 21	1 14 25
3	0 29 55	0 32 24	0 35 0	0 37 42	0 40 34	0 43 36	0 46 46	0 50 4	0 53 29	0 57 1	1 0 46	1 4 36	1 8 33	1 12 39	1 16 53
4	0 30 43	0 33 17	0 35 59	0 38 49	0 41 48	0 44 57	0 48 14	0 51 40	0 55 14	0 58 52	1 2 47	1 6 46	1 10 52	1 15 7	1 19 33
5	0 31 36	0 34 16	0 37 5	0 40 3	0 43 9	0 46 25	0 49 49	0 53 24	0 57 8	1 0 52	1 4 59	1 9 8	1 13 23	1 17 48	1 22 25
6	0 32 33	0 35 21	0 38 18	0 41 23	0 44 37	0 48 2	0 51 35	0 55 19	0 59 12	1 3 5	1 7 22	1 11 43	1 16 9	1 20 45	1 25 38
7	0 33 36	0 36 32	0 39 37	0 42 50	0 46 13	0 49 47	0 53 30	0 57 23	1 1 28	1 5 33	1 9 59	1 14 31	1 19 9	1 23 57	1 29 8
8	0 34 46	0 37 50	0 41 4	0 44 26	0 47 59	0 51 43	0 55 37	0 59 40	1 3 56	1 8 18	1 12 51	1 17 33	1 22 26	1 27 26	1 32 58
9	0 36 4	0 39 16	0 42 40	0 46 12	0 49 56	0 53 51	0 57 57	1 2 13	1 6 41	1 11 15	1 16 3	1 20 58	1 26 5	1 31 20	1 36 57
10	0 37 30	0 40 50	0 44 26	0 48 10	0 52 7	0 56 13	1 0 32	1 5 2	1 9 43	1 14 30	1 19 33	1 24 42	1 30 4	1 35 34	1 41 17
11	0 39 6	0 42 37	0 46 24	0 50 20	0 54 33	0 58 53	1 3 27	1 8 11	1 13 7	1 18 13	1 23 32	1 28 59	1 34 38	1 40 26	1 46 27
12	0 40 53	0 44 41	0 48 41	0 52 53	0 57 18	1 1 54	1 6 43	1 11 41	1 16 52	1 22 17	1 27 52	1 33 37	1 39 33	1 45 39	1 51 58
13	0 42 57	0 47 2	0 51 17	0 55 44	1 0 26	1 5 19	1 10 25	1 15 44	1 21 15	1 26 59	1 32 55	1 39 1	1 45 18	1 51 46	1 58 26
14	0 45 22	0 49 39	0 54 13	0 59 0	1 4 0	1 9 13	1 14 37	1 20 17	1 26 9	1 32 12	1 38 29	1 44 56	1 51 35	1 58 26	2 5 28
15	0 48 3	0 52 37	0 57 31	1 2 38	1 7 58	1 13 41	1 19 34	1 25 37	1 31 54	1 38 22	1 45 5	1 51 58	1 59 3	2 6 20	2 13 47
16	0 51 25	0 56 25	1 1 45	1 7 17	1 12 58	1 18 58	1 25 20	1 31 47	1 38 30	1 45 24	1 52 34	1 59 53	2 7 25	2 15 8	2 23 0
17	0 55 18	1 0 40	1 6 29	1 12 30	1 18 44	1 25 16	1 32 9	1 39 10	1 46 26	1 53 53	2 1 34	2 9 27	2 17 30	2 25 47	2 34 14
18	1 0 5	1 6 2	1 12 21	1 18 51	1 25 39	1 32 44	1 40 8	1 47 44	1 55 34	2 3 35	2 11 48	2 20 15	2 28 50	2 37 42	2 46 45
19	1 5 53	1 12 50	1 19 52	1 27 8	1 34 38	1 42 24	1 50 31	1 58 49	2 7 21	2 16 3	2 24 58	2 34 7	2 43 24	2 52 55	3 2 36
20	1 13 25	1 20 44	1 28 30	1 36 33	1 44 45	1 53 12	2 2 3	2 11 3	2 20 17	2 29 42	2 39 19	2 49 10	2 59 10	3 9 20	3 19 39
21	1 23 10	1 31 27	1 40 2	1 48 55	1 58 8	2 7 31	2 17 10	2 26 58	2 37 4	2 47 19	2 57 46	3 8 29	3 19 13	3 30 1	3 41 5
22	1 36 11	1 45 35	1 55 17	2 5 15	2 15 24	2 25 44	2 36 28	2 47 18	2 58 14	3 9 20	3 20 37	3 32 2	3 43 37	3 55 17	4 6 59
23	1 54 3	2 4 46	2 15 43	2 26 47	2 38 4	2 49 36	3 1 12	3 12 57	3 24 48	3 36 54	3 48 59	4 1 13	4 13 31	4 25 53	4 38 20

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
°	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 27 51	0 30 2	0 32 22	0 34 48	0 37 23	0 40 5	0 42 55	0 45 53	0 48 57	0 52 10	0 55 29	0 58 56	1 2 30	1 6 12	1 10 1
1	0 27 15	0 29 21	0 31 36	0 33 58	0 36 28	0 39 6	0 41 51	0 44 43	0 47 40	0 50 46	0 53 59	0 57 20	1 0 47	1 4 22	1 8 4
2	0 26 41	0 28 43	0 30 54	0 33 11	0 35 36	0 38 9	0 40 49	0 43 35	0 46 27	0 49 26	0 52 34	0 55 49	0 59 10	1 2 38	1 6 14
3	0 26 9	0 28 7	0 30 14	0 32 27	0 34 47	0 37 15	0 39 50	0 42 30	0 45 18	0 48 10	0 51 13	0 54 22	0 57 37	1 0 59	1 4 29
4	0 25 39	0 27 33	0 29 36	0 31 45	0 34 0	0 36 23	0 38 53	0 41 28	0 44 12	0 46 57	0 49 56	0 52 59	0 56 8	0 59 24	1 2 48
5	0 25 10	0 27 1	0 29 0	0 31 5	0 33 16	0 35 34	0 37 59	0 40 29	0 43 9	0 45 48	0 48 43	0 51 40	0 54 43	0 57 53	1 1 11
6	0 24 42	0 26 30	0 28 25	0 30 26	0 32 33	0 34 47	0 37 8	0 39 34	0 42 9	0 44 44	0 47 34	0 50 26	0 53 23	0 56 28	0 59 40
7	0 24 16	0 26 1	0 27 52	0 29 50	0 31 53	0 34 3	0 36 20	0 38 42	0 41 12	0 43 44	0 46 29	0 49 16	0 52 8	0 55 8	0 58 15
8	0 23 51	0 25 33	0 27 21	0 29 16	0 31 16	0 33 22	0 35 35	0 37 53	0 40 19	0 42 48	0 45 28	0 48 10	0 50 58	0 53 53	0 56 55
9	0 23 28	0 25 7	0 26 52	0 28 44	0 30 41	0 32 44	0 34 53	0 37 7	0 39 29	0 41 55	0 44 30	0 47 8	0 49 52	0 52 42	0 55 39
10	0 23 6	0 24 43	0 26 25	0 28 14	0 30 6	0 32 8	0 34 14	0 36 25	0 38 43	0 41 6	0 43 36	0 46 9	0 48 49	0 51 34	0 54 26
11	0 22 45	0 24 20	0 26 0	0 27 45	0 29 36	0 31 33	0 33 36	0 35 44	0 37 59	0 40 19	0 42 46	0 45 13	0 47 49	0 50 29	0 53 16
12	0 22 25	0 23 58	0 25 36	0 27 17	0 29 5	0 30 59	0 32 59	0 35 4	0 37 16	0 39 33	0 41 57	0 44 19	0 46 51	0 49 26	0 52 9
13	0 22 6	0 23 37	0 25 12	0 26 50	0 28 35	0 30 26	0 32 23	0 34 25	0 36 34	0 38 48	0 41 9	0 43 27	0 45 55	0 48 26	0 51 5
14	0 21 47	0 23 16	0 24 49	0 26 24	0 28 6	0 29 54	0 31 48	0 33 47	0 35 53	0 38 4	0 40 22	0 42 37	0 45 1	0 47 29	0 50 4
15	0 21 29	0 22 55	0 24 26	0 25 59	0 27 38	0 29 23	0 31 14	0 33 10	0 35 13	0 37 21	0 39 36	0 41 48	0 44 9	0 46 34	0 49 5
16	0 21 11	0 22 35	0 24 4	0 25 35	0 27 12	0 28 54	0 30 42	0 32 35	0 34 34	0 36 39	0 38 51	0 41 1	0 43 19	0 45 41	0 48 8
17	0 20 53	0 22 15	0 23 42	0 25 12	0 26 47	0 28 26	0 30 11	0 32 1	0 33 57	0 35 58	0 38 7	0 40 15	0 42 30	0 44 49	0 47 13
18	0 20 36	0 21 56	0 23 21	0 24 49	0 26 22	0 27 59	0 29 41	0 31 28	0 33 21	0 35 19	0 37 24	0 39 30	0 41 42	0 43 58	0 46 19
19	0 20 19	0 21 37	0 23 0	0 24 26	0 25 57	0 27 32	0 29 12	0 30 57	0 32 47	0 34 42	0 36 42	0 38 46	0 40 55	0 43 8	0 45 26
20	0 20 2	0 21 18	0 22 39	0 24 4	0 25 33	0 27 6	0 28 44	0 30 27	0 32 14	0 34 6	0 36 2	0 38 3	0 40 9	0 42 19	0 44 34
21	0 19 46	0 21 0	0 22 19	0 23 42	0 25 10	0 26 41	0 28 17	0 29 58	0 31 42	0 33 32	0 35 25	0 37 23	0 39 26	0 41 33	0 43 44
22	0 19 30	0 20 43	0 22 0	0 23 21	0 24 47	0 26 17	0 27 51	0 29 29	0 31 11	0 32 59	0 34 49	0 36 44	0 38 44	0 40 49	0 42 56
23	0 19 15	0 20 26	0 21 42	0 23 1	0 24 25	0 25 53	0 27 26	0 29 1	0 30 41	0 32 26	0 34 14	0 36 7	0 38 4	0 40 6	0 42 11

LATITUDE 26° NORTH OR SOUTH.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 13 58	1 18 1	1 22 12	1 26 30	1 30 53	1 35 25	1 40 4	1 44 48	1 49 40	1 54 40	1 59 44	2 4 56	2 10 14	2 15 38	2 21 10
1	1 11 55	1 15 49	1 19 52	1 24 2	1 28 16	1 32 39	1 37 10	1 41 44	1 46 28	1 51 19	1 56 15	2 1 17	2 6 27	2 11 40	2 17 3
2	1 9 57	1 13 43	1 17 39	1 21 41	1 25 47	1 30 2	1 34 25	1 38 51	1 43 27	1 48 9	1 52 57	1 57 50	2 2 51	2 7 54	2 13 8
3	1 8 4	1 11 43	1 15 32	1 19 27	1 23 26	1 27 34	1 31 48	1 36 7	1 40 35	1 45 9	1 49 48	1 54 33	1 59 25	2 4 19	2 9 24
4	1 6 16	1 9 49	1 13 31	1 17 19	1 21 12	1 25 13	1 29 19	1 33 31	1 37 51	1 42 17	1 46 48	1 51 25	1 56 8	2 0 55	2 5 51
5	1 4 33	1 8 1	1 11 36	1 15 17	1 19 5	1 22 59	1 26 58	1 31 3	1 35 15	1 39 33	1 43 56	1 48 25	1 53 0	1 57 41	2 2 28
6	1 2 57	1 6 20	1 9 49	1 13 24	1 17 6	1 20 54	1 24 47	1 28 43	1 32 48	1 36 57	1 41 14	1 45 35	1 50 4	1 54 37	1 59 15
7	1 1 27	1 4 45	1 8 8	1 11 37	1 15 13	1 18 55	1 22 42	1 26 30	1 30 28	1 34 30	1 38 41	1 42 55	1 47 17	1 51 43	1 56 13
8	1 0 2	1 3 14	1 6 32	1 9 55	1 13 25	1 17 1	1 20 42	1 24 24	1 28 16	1 32 12	1 36 16	1 40 24	1 44 39	1 48 58	1 53 21
9	0 58 40	1 1 47	1 5 0	1 8 18	1 11 42	1 15 12	1 18 47	1 22 25	1 26 11	1 30 2	1 33 59	1 38 1	1 42 9	1 46 22	1 50 39
10	0 57 22	1 0 24	1 3 32	1 6 45	1 10 3	1 13 27	1 16 57	1 20 32	1 24 12	1 27 58	1 31 49	1 35 45	1 39 47	1 43 54	1 48 6
11	0 56 8	0 59 6	1 2 8	1 5 16	1 8 29	1 11 48	1 15 12	1 18 43	1 22 18	1 25 59	1 29 44	1 33 34	1 37 30	1 41 31	1 45 37
12	0 54 57	0 57 51	1 0 48	1 3 51	1 6 59	1 10 13	1 13 32	1 16 58	1 20 28	1 24 4	1 27 43	1 31 28	1 35 18	1 39 13	1 43 13
13	0 53 49	0 56 38	0 59 31	1 2 30	1 5 34	1 8 43	1 11 57	1 15 18	1 18 42	1 22 13	1 25 47	1 29 27	1 33 11	1 37 1	1 40 55
14	0 52 44	0 55 28	0 58 17	1 1 12	1 4 12	1 7 17	1 10 26	1 13 41	1 17 0	1 20 26	1 23 55	1 27 30	1 31 9	1 34 54	1 38 42
15	0 51 41	0 54 20	0 57 5	0 59 56	1 2 52	1 5 53	1 8 58	1 12 7	1 15 22	1 18 43	1 22 7	1 25 37	1 29 11	1 32 51	1 36 34
16	0 50 40	0 53 14	0 55 55	0 58 42	1 1 34	1 4 31	1 7 32	1 10 36	1 13 47	1 17 3	1 20 21	1 23 46	1 27 16	1 30 51	1 34 29
17	0 49 41	0 52 11	0 54 48	0 57 31	1 0 19	1 3 12	1 6 9	1 9 9	1 12 15	1 15 26	1 18 40	1 22 0	1 25 25	1 28 55	1 32 28
18	0 48 44	0 51 10	0 53 44	0 56 23	0 59 7	1 1 56	1 4 49	1 7 45	1 10 47	1 13 53	1 17 3	1 20 19	1 23 39	1 27 4	1 30 32
19	0 47 48	0 50 12	0 52 43	0 55 18	0 57 58	1 0 43	1 3 32	1 6 25	1 9 23	1 12 24	1 15 30	1 18 42	1 21 58	1 25 18	1 28 42
20	0 46 53	0 49 16	0 51 44	0 54 16	0 56 52	0 59 33	1 2 18	1 5 8	1 8 2	1 10 59	1 14 1	1 17 9	1 20 21	1 23 36	1 26 56
21	0 46 0	0 48 22	0 50 46	0 53 15	0 55 47	0 58 24	1 1 6	1 3 52	1 6 43	1 9 37	1 12 35	1 15 38	1 18 46	1 21 57	1 25 12
22	0 45 9	0 47 28	0 49 49	0 52 15	0 54 44	0 57 17	0 59 56	1 2 38	1 5 25	1 8 17	1 11 11	1 14 9	1 17 12	1 20 19	1 23 30
23	0 44 21	0 46 35	0 48 53	0 51 16	0 53 42	0 56 12	0 58 47	1 1 26	1 4 9	1 6 57	1 9 48	1 12 42	1 15 40	1 18 43	1 21 50

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	2 26 47	2 32 31	2 38 21	2 44 17	2 50 19	2 56 27	3 2 41	3 9 1	3 15 26	3 21 58	3 28 35	3 35 18	3 42 5	3 48 59	3 55 59
1	2 22 31	2 28 6	2 33 46	2 39 30	2 45 21	2 51 19	2 57 23	3 3 34	3 9 49	3 16 8	3 22 33	3 29 5	3 35 41	3 42 25	3 49 15
2	2 18 27	2 23 53	2 29 23	2 34 56	2 40 38	2 46 26	2 52 20	2 58 21	3 4 27	3 10 34	3 16 49	3 23 10	3 29 36	3 36 10	3 42 50
3	2 14 34	2 19 51	2 25 12	2 30 36	2 36 9	2 41 47	2 47 31	2 53 22	2 59 19	3 5 16	3 11 21	3 17 32	3 23 48	3 30 12	3 36 42
4	2 10 52	2 16 0	2 21 12	2 26 28	2 31 52	2 37 21	2 42 55	2 48 36	2 54 24	3 0 13	3 6 8	3 12 9	3 18 15	3 24 29	3 30 49
5	2 7 21	2 12 20	2 17 23	2 22 32	2 27 47	2 33 7	2 38 31	2 44 3	2 49 42	2 55 24	3 1 9	3 7 0	3 12 56	3 19 0	3 25 11
6	2 4 0	2 8 52	2 13 48	2 18 48	2 23 55	2 29 7	2 34 23	2 39 47	2 45 17	2 50 50	2 56 27	3 2 10	3 7 58	3 13 53	3 19 54
7	2 0 50	2 5 35	2 10 24	2 15 16	2 20 15	2 25 19	2 30 27	2 35 43	2 41 4	2 46 29	2 51 59	2 57 34	3 3 14	3 9 0	3 14 52
8	1 57 51	2 2 28	2 7 10	2 12 55	2 16 47	2 21 43	2 26 44	2 31 52	2 37 5	2 42 22	2 47 45	2 53 12	2 58 44	3 4 21	3 10 4
9	1 55 2	1 59 31	2 4 6	2 9 45	2 13 29	2 18 18	2 23 12	2 28 12	2 33 17	2 38 27	2 43 43	2 49 2	2 54 26	2 59 55	3 5 29
10	1 52 22	1 56 44	2 1 12	2 5 45	2 10 22	2 15 4	2 19 51	2 24 43	2 29 40	2 34 43	2 39 52	2 45 4	2 50 20	2 55 41	3 1 6
11	1 49 47	1 54 4	1 58 26	2 2 52	2 7 23	2 11 58	2 16 38	2 21 23	2 26 13	2 31 9	2 36 11	2 41 16	2 46 23	2 51 37	2 56 55
12	1 47 17	1 51 29	1 55 45	2 0 5	2 4 30	2 8 59	2 13 33	2 18 11	2 22 54	2 27 43	2 32 38	2 37 36	2 42 35	2 47 42	2 52 53
13	1 44 53	1 48 59	1 53 9	1 57 23	2 1 42	2 6 5	2 10 33	2 15 5	2 19 42	2 24 24	2 29 12	2 34 3	2 38 55	2 43 55	2 48 59
14	1 42 34	1 46 34	1 50 38	1 54 46	1 58 59	2 3 16	2 7 38	2 12 4	2 16 35	2 21 10	2 25 51	2 30 35	2 35 22	2 40 16	2 45 14
15	1 40 21	1 44 14	1 48 12	1 52 14	1 56 21	2 0 32	2 4 48	2 9 8	2 13 32	2 18 1	2 22 35	2 27 13	2 31 56	2 36 44	2 41 36
16	1 38 12	1 41 58	1 45 51	1 49 48	1 53 49	1 57 54	2 2 4	2 6 19	2 10 37	2 15 0	2 19 28	2 24 0	2 28 37	2 33 19	2 38 5
17	1 36 6	1 39 48	1 43 36	1 47 28	1 51 23	1 55 23	1 59 27	2 3 36	2 7 49	2 12 6	2 16 28	2 20 54	2 25 25	2 30 1	2 34 41
18	1 34 5	1 37 43	1 41 26	1 45 13	1 49 3	1 52 58	1 56 57	2 1 0	2 5 8	2 9 19	2 13 35	2 17 55	2 22 20	2 27 50	2 31 24
19	1 32 10	1 35 43	1 39 21	1 45 3	1 46 48	1 50 38	1 54 32	1 58 30	2 2 33	2 6 39	2 10 49	2 15 3	2 19 22	2 24 46	2 28 14
20	1 30 20	1 33 48	1 37 21	1 40 58	1 44 38	1 48 23	1 52 12	1 56 5	2 0 3	2 4 4	2 8 9	2 12 18	2 16 32	2 20 50	2 25 12
21	1 28 32	1 31 56	1 35 24	1 38 56	1 42 32	1 46 12	1 49 56	1 53 44	1 57 37	2 1 33	2 5 33	2 9 37	2 13 45	2 17 57	2 22 14
22	1 26 46	1 30 5	1 33 29	1 36 57	1 40 29	1 44 4	1 47 43	1 51 26	1 55 14	1 59 5	2 3 0	2 6 58	2 11 0	2 15 7	2 19 20
23	1 25 1	1 28 16	1 31 35	1 34 59	1 38 27	1 41 57	1 45 31	1 49 10	1 52 53	1 56 39	2 0 29	2 4 22	2 8 18	2 12 20	2 16 28

LATITUDE 27° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 49	0 11 1	0 11 20	0 11 46	0 12 21	0 13 3	0 13 54	0 14 51	0 15 56	0 17 10	0 18 30	0 19 59	0 21 33	0 23 18	0 25 8
1	0 10 50	0 11 2	0 11 22	0 11 49	0 12 26	0 13 9	0 14 2	0 15 1	0 16 8	0 17 24	0 18 48	0 20 19	0 21 58	0 23 45	0 25 40
2	0 10 51	0 11 4	0 11 24	0 11 53	0 12 31	0 13 16	0 14 10	0 15 11	0 16 21	0 17 40	0 19 7	0 20 41	0 22 25	0 24 14	0 26 14
3	0 10 53	0 11 6	0 11 27	0 11 57	0 12 36	0 13 23	0 14 18	0 15 22	0 16 35	0 17 57	0 19 27	0 21 4	0 22 53	0 24 45	0 26 50
4	0 10 54	0 11 7	0 11 29	0 12 1	0 12 41	0 13 30	0 14 27	0 15 34	0 16 50	0 18 14	0 19 48	0 21 30	0 23 23	0 25 20	0 27 29
5	0 10 55	0 11 9	0 11 32	0 12 5	0 12 46	0 13 38	0 14 37	0 15 46	0 17 7	0 18 33	0 20 11	0 21 58	0 23 54	0 25 58	0 28 11
6	0 10 56	0 11 11	0 11 35	0 12 9	0 12 53	0 13 47	0 14 48	0 16 0	0 17 25	0 18 54	0 20 36	0 22 28	0 24 28	0 26 38	0 28 57
7	0 10 58	0 11 13	0 11 38	0 12 14	0 13 0	0 13 56	0 15 0	0 16 15	0 17 45	0 19 18	0 21 3	0 23 0	0 25 5	0 27 21	0 29 46
8	0 11 0	0 11 16	0 11 41	0 12 19	0 13 7	0 14 6	0 15 13	0 16 33	0 18 6	0 19 44	0 21 33	0 23 35	0 25 46	0 28 9	0 30 40
9	0 11 1	0 11 18	0 11 44	0 12 24	0 13 15	0 14 17	0 15 27	0 16 52	0 18 27	0 20 11	0 22 6	0 24 15	0 26 32	0 29 2	0 31 40
10	0 11 2	0 11 20	0 11 48	0 12 30	0 13 24	0 14 28	0 15 42	0 17 12	0 18 50	0 20 41	0 22 43	0 24 59	0 27 26	0 30 2	0 32 47
11	0 11 4	0 11 23	0 11 53	0 12 36	0 13 34	0 14 43	0 16 0	0 17 35	0 19 20	0 21 16	0 23 25	0 25 48	0 28 24	0 31 8	0 34 3
12	0 11 6	0 11 26	0 11 58	0 12 42	0 13 44	0 14 58	0 16 20	0 18 0	0 19 53	0 21 55	0 24 12	0 26 42	0 29 27	0 32 20	0 35 27
13	0 11 9	0 11 29	0 12 3	0 12 49	0 13 54	0 15 14	0 16 42	0 18 28	0 20 29	0 22 40	0 25 6	0 27 43	0 30 38	0 33 42	0 37 1
14	0 11 10	0 11 31	0 12 8	0 13 0	0 14 9	0 15 31	0 17 7	0 19 0	0 21 9	0 23 30	0 26 6	0 28 55	0 32 0	0 35 18	0 38 50
15	0 11 12	0 11 34	0 12 14	0 13 11	0 14 24	0 15 50	0 17 36	0 19 36	0 21 54	0 24 26	0 27 14	0 30 18	0 33 36	0 37 8	0 40 54
16	0 11 14	0 11 38	0 12 22	0 13 26	0 14 41	0 16 16	0 18 11	0 20 21	0 22 49	0 25 34	0 28 35	0 31 54	0 35 27	0 39 18	0 43 21
17	0 11 17	0 11 42	0 12 30	0 13 38	0 15 0	0 16 46	0 18 52	0 21 15	0 23 56	0 26 54	0 30 11	0 33 45	0 37 36	0 41 47	0 46 12
18	0 11 19	0 11 47	0 12 40	0 13 56	0 15 35	0 17 26	0 19 45	0 22 20	0 25 18	0 28 34	0 32 9	0 36 3	0 40 16	0 44 51	0 49 39
19	0 11 21	0 11 52	0 12 50	0 14 15	0 16 13	0 18 13	0 20 53	0 23 37	0 26 56	0 30 34	0 34 30	0 38 49	0 43 30	0 48 33	0 53 48
20	0 11 23	0 11 58	0 13 9	0 14 38	0 16 43	0 19 8	0 21 55	0 25 17	0 28 56	0 32 59	0 37 34	0 42 22	0 47 32	0 53 4	0 58 59
21	0 11 26	0 12 10	0 13 28	0 15 14	0 17 37	0 20 22	0 23 40	0 27 26	0 31 39	0 36 22	0 41 25	0 47 51	0 52 44	0 59 1	1 5 37
22	0 11 30	0 12 23	0 13 50	0 15 57	0 18 45	0 22 10	0 25 55	0 30 23	0 35 25	0 40 41	0 46 34	0 52 52	0 59 40	1 6 52	1 14 15
23	0 11 36	0 12 42	0 14 38	0 17 13	0 20 42	0 24 38	0 29 18	0 34 38	0 40 36	0 47 2	0 53 52	1 1 21	1 9 9	1 17 26	1 26 1

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 49	0 11 1	0 11 20	0 11 46	0 12 21	0 13 3	0 13 54	0 14 51	0 15 56	0 17 10	0 18 30	0 19 59	0 21 33	0 23 18	0 25 8
1	0 10 48	0 10 59	0 11 17	0 11 42	0 12 17	0 12 57	0 13 46	0 14 42	0 15 45	0 16 56	0 18 14	0 19 40	0 21 11	0 22 52	0 24 38
2	0 10 47	0 10 57	0 11 14	0 11 38	0 12 13	0 12 52	0 13 38	0 14 33	0 15 34	0 16 42	0 17 58	0 19 21	0 20 50	0 22 27	0 24 10
3	0 10 45	0 10 55	0 11 12	0 11 35	0 12 9	0 12 47	0 13 31	0 14 24	0 15 23	0 16 29	0 17 43	0 19 3	0 20 30	0 22 4	0 23 44
4	0 10 43	0 10 53	0 11 9	0 11 32	0 12 4	0 12 41	0 13 24	0 14 15	0 15 13	0 16 17	0 17 28	0 18 46	0 20 11	0 21 41	0 23 19
5	0 10 41	0 10 51	0 11 7	0 11 29	0 12 0	0 12 36	0 13 18	0 14 7	0 15 4	0 16 6	0 17 14	0 18 29	0 19 53	0 21 20	0 22 56
6	0 10 40	0 10 49	0 11 4	0 11 26	0 11 56	0 12 31	0 13 12	0 14 0	0 14 55	0 15 55	0 17 1	0 18 15	0 19 35	0 21 0	0 22 34
7	0 10 38	0 10 47	0 11 2	0 11 23	0 11 52	0 12 26	0 13 6	0 13 53	0 14 46	0 15 45	0 16 49	0 18 1	0 19 18	0 20 41	0 22 12
8	0 10 36	0 10 45	0 11 0	0 11 20	0 11 48	0 12 21	0 13 0	0 13 46	0 14 38	0 15 35	0 16 37	0 17 47	0 19 2	0 20 23	0 21 51
9	0 10 35	0 10 43	0 10 58	0 11 17	0 11 44	0 12 16	0 12 54	0 13 39	0 14 29	0 15 25	0 16 26	0 17 34	0 18 47	0 20 6	0 21 31
10	0 10 33	0 10 41	0 10 56	0 11 15	0 11 41	0 12 12	0 12 49	0 13 33	0 14 21	0 15 15	0 16 15	0 17 21	0 18 33	0 19 50	0 21 12
11	0 10 31	0 10 39	0 10 54	0 11 12	0 11 38	0 12 8	0 12 44	0 13 26	0 14 14	0 15 6	0 16 5	0 17 9	0 18 20	0 19 38	0 20 55
12	0 10 30	0 10 37	0 10 52	0 11 9	0 11 35	0 12 4	0 12 39	0 13 20	0 14 7	0 14 58	0 15 56	0 16 58	0 18 7	0 19 21	0 20 39
13	0 10 29	0 10 36	0 10 50	0 11 7	0 11 32	0 12 0	0 12 35	0 13 14	0 14 1	0 14 51	0 15 47	0 16 47	0 17 55	0 19 7	0 20 23
14	0 10 28	0 10 35	0 10 48	0 11 5	0 11 29	0 11 57	0 12 31	0 13 9	0 13 55	0 14 44	0 15 38	0 16 37	0 17 43	0 18 53	0 20 7
15	0 10 27	0 10 34	0 10 46	0 11 3	0 11 27	0 11 54	0 12 27	0 13 4	0 13 49	0 14 36	0 15 29	0 16 27	0 17 31	0 18 39	0 19 52
16	0 10 25	0 10 31	0 10 43	0 10 59	0 11 23	0 11 50	0 12 22	0 12 58	0 13 41	0 14 27	0 15 20	0 16 16	0 17 18	0 18 25	0 19 36
17	0 10 22	0 10 28	0 10 40	0 10 55	0 11 19	0 11 46	0 12 17	0 12 52	0 13 34	0 14 18	0 15 11	0 16 5	0 17 5	0 18 11	0 19 20
18	0 10 19	0 10 25	0 10 37	0 10 52	0 11 15	0 11 41	0 12 12	0 12 46	0 13 27	0 14 10	0 15 2	0 15 54	0 16 53	0 17 57	0 19 4
19	0 10 16	0 10 22	0 10 34	0 10 49	0 11 11	0 11 36	0 12 6	0 12 40	0 13 20	0 14 2	0 14 52	0 15 44	0 16 41	0 17 43	0 18 49
20	0 10 13	0 10 19	0 10 30	0 10 45	0 11 6	0 11 31	0 12 0	0 12 34	0 13 13	0 13 54	0 14 42	0 15 34	0 16 29	0 17 30	0 18 35
21	0 10 10	0 10 16	0 10 27	0 10 41	0 11 2	0 11 26	0 11 54	0 12 28	0 13 6	0 13 46	0 14 33	0 15 24	0 16 18	0 17 17	0 18 21
22	0 10 6	0 10 13	0 10 24	0 10 38	0 10 58	0 11 21	0 11 49	0 12 22	0 12 59	0 13 39	0 14 24	0 15 14	0 16 7	0 17 5	0 18 7
23	0 10 4	0 10 10	0 10 21	0 10 35	0 10 55	0 11 17	0 11 44	0 12 16	0 12 52	0 13 32	0 14 16	0 15 4	0 15 56	0 16 53	0 17 54

LATITUDE 27° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 27 6	0 29 12	0 31 26	0 33 46	0 36 14	0 38 50	0 41 32	0 44 22	0 47 20	0 50 24	0 53 36	0 56 55	1 0 20	1 3 53	1 7 33
1	0 27 42	0 29 53	0 32 11	0 34 36	0 37 9	0 39 50	0 42 38	0 45 34	0 48 38	0 51 49	0 55 8	0 58 33	1 2 5	1 5 45	1 9 32
2	0 28 20	0 30 36	0 32 59	0 35 29	0 38 7	0 40 54	0 43 48	0 46 50	0 50 1	0 53 18	0 56 45	1 0 16	1 3 55	1 7 43	1 11 38
3	0 29 0	0 31 22	0 33 50	0 36 26	0 39 10	0 42 3	0 45 3	0 48 11	0 51 28	0 54 52	0 58 27	1 2 5	1 5 52	1 9 48	1 13 51
4	0 29 44	0 32 11	0 34 44	0 37 27	0 40 17	0 43 16	0 46 24	0 49 39	0 53 3	0 56 35	1 0 17	1 4 4	1 7 59	1 12 3	1 16 16
5	0 30 32	0 33 4	0 35 43	0 38 32	0 41 30	0 44 36	0 47 52	0 51 14	0 54 46	0 58 26	1 2 16	1 6 13	1 10 18	1 14 30	1 18 53
6	0 31 25	0 34 3	0 36 49	0 39 44	0 42 49	0 46 3	0 49 27	0 52 57	0 56 34	1 0 28	1 4 28	1 8 33	1 12 48	1 17 11	1 21 44
7	0 32 22	0 35 6	0 38 0	0 41 3	0 44 16	0 47 38	0 51 11	0 54 50	0 58 30	1 2 40	1 6 49	1 11 4	1 15 30	1 20 5	1 24 49
8	0 33 23	0 36 15	0 39 19	0 42 30	0 45 51	0 49 22	0 53 5	0 56 53	1 0 36	1 5 2	1 9 22	1 13 47	1 18 24	1 23 11	1 28 7
9	0 34 30	0 37 31	0 40 45	0 44 5	0 47 36	0 51 17	0 55 10	0 59 9	1 3 11	1 7 39	1 12 10	1 16 48	1 21 35	1 26 34	1 31 42
10	0 35 45	0 38 54	0 42 18	0 45 48	0 49 30	0 53 23	0 57 26	1 1 38	1 6 1	1 10 35	1 15 17	1 20 10	1 25 13	1 30 25	1 35 46
11	0 37 11	0 40 29	0 44 4	0 47 45	0 51 38	0 55 44	1 0 0	1 4 26	1 9 3	1 13 52	1 18 49	1 23 57	1 29 16	1 34 44	1 40 21
12	0 38 46	0 42 16	0 46 3	0 49 57	0 54 2	0 58 21	1 2 51	1 7 32	1 12 24	1 17 28	1 22 41	1 28 5	1 33 40	1 39 25	1 45 19
13	0 40 32	0 44 16	0 48 16	0 52 24	0 56 42	1 1 16	1 6 2	1 10 58	1 16 5	1 21 25	1 26 55	1 32 37	1 38 29	1 44 31	1 50 44
14	0 42 35	0 46 34	0 50 48	0 55 11	0 59 47	1 4 37	1 9 38	1 14 52	1 20 19	1 25 59	1 31 48	1 37 48	1 44 0	1 50 22	1 56 55
15	0 44 54	0 49 9	0 53 40	0 58 22	1 3 19	1 8 28	1 13 48	1 19 25	1 25 14	1 31 16	1 37 28	1 43 48	1 50 22	1 57 6	2 4 2
16	0 47 39	0 52 14	0 57 6	1 2 9	1 7 26	1 12 52	1 18 36	1 24 33	1 30 44	1 37 8	1 43 44	1 50 31	1 57 28	2 4 35	2 11 56
17	0 50 50	0 55 47	1 1 3	1 6 30	1 12 12	1 18 8	1 24 21	1 30 42	1 37 21	1 44 11	1 51 15	1 58 33	2 5 58	2 13 33	2 21 24
18	0 54 44	1 0 9	1 5 52	1 11 45	1 17 56	1 24 22	1 31 6	1 37 59	1 45 5	1 52 25	1 59 59	2 7 47	2 15 42	2 23 49	2 32 10
19	0 59 23	1 5 20	1 11 33	1 17 56	1 24 40	1 31 40	1 38 59	1 46 30	1 54 8	2 2 4	2 10 12	2 18 36	2 27 4	2 35 49	2 44 44
20	1 5 13	1 11 40	1 18 34	1 25 42	1 33 1	1 40 41	1 48 43	1 56 49	2 5 8	2 13 41	2 22 31	2 31 34	2 40 42	2 50 4	2 59 37
21	1 12 30	1 29 46	1 27 25	1 35 23	1 43 28	1 51 51	2 0 29	2 9 32	2 18 33	2 27 54	2 37 26	2 47 7	2 57 4	3 7 7	3 17 16
22	1 22 4	1 30 19	1 38 46	1 57 38	1 56 42	2 5 57	2 15 28	2 25 18	2 35 10	2 45 21	2 55 39	3 6 10	3 16 48	3 27 37	3 38 32
23	1 34 56	1 44 15	1 53 53	2 3 44	2 13 43	2 23 56	2 34 32	2 45 16	2 56 7	3 7 9	3 18 16	3 29 37	3 40 59	3 52 35	4 4 10

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 27 6	0 29 12	0 31 26	0 33 46	0 36 14	0 38 50	0 41 32	0 44 22	0 47 20	0 50 24	0 53 36	0 56 55	1 0 20	1 3 53	1 7 33
1	0 26 32	0 28 34	0 30 43	0 33 0	0 35 24	0 37 54	0 40 30	0 43 15	0 46 7	0 49 5	0 52 13	0 55 24	0 58 42	1 2 8	1 5 41
2	0 26 0	0 27 59	0 30 4	0 32 17	0 34 36	0 37 1	0 39 32	0 42 12	0 44 59	0 47 52	0 50 54	0 53 59	0 57 11	1 0 31	1 3 58
3	0 25 31	0 27 26	0 29 27	0 31 35	0 33 50	0 36 11	0 38 38	0 41 13	0 43 55	0 46 43	0 49 38	0 52 38	0 55 46	0 59 0	1 2 21
4	0 25 3	0 26 54	0 28 52	0 30 55	0 33 7	0 35 24	0 37 48	0 40 17	0 42 54	0 45 37	0 48 27	0 51 22	0 54 25	0 57 33	1 0 49
5	0 24 36	0 26 24	0 28 18	0 30 18	0 32 26	0 34 39	0 37 0	0 39 24	0 41 57	0 44 34	0 47 20	0 50 11	0 53 8	0 56 11	0 59 22
6	0 24 11	0 25 55	0 27 46	0 29 43	0 31 47	0 33 56	0 36 13	0 38 34	0 41 2	0 43 35	0 46 16	0 49 3	0 51 55	0 54 52	0 57 58
7	0 23 47	0 25 28	0 27 17	0 29 10	0 31 10	0 33 16	0 35 29	0 37 46	0 40 10	0 42 40	0 45 16	0 47 58	0 50 45	0 53 38	0 56 44
8	0 23 23	0 25 2	0 26 49	0 28 39	0 30 35	0 32 38	0 34 47	0 37 1	0 39 20	0 41 47	0 44 19	0 46 56	0 49 38	0 52 27	0 55 23
9	0 23 1	0 24 37	0 26 21	0 28 9	0 30 2	0 32 1	0 34 7	0 36 18	0 38 33	0 40 56	0 43 24	0 45 57	0 48 35	0 51 19	0 54 11
10	0 22 41	0 24 14	0 25 55	0 27 40	0 29 30	0 31 26	0 33 28	0 35 36	0 37 48	0 40 7	0 42 31	0 45 0	0 47 35	0 50 15	0 53 2
11	0 22 22	0 23 53	0 25 31	0 27 13	0 28 59	0 30 53	0 32 52	0 34 57	0 37 6	0 39 21	0 41 42	0 44 7	0 46 38	0 49 13	0 51 55
12	0 22 3	0 23 32	0 25 7	0 26 47	0 28 29	0 30 21	0 32 17	0 34 19	0 36 26	0 38 37	0 40 55	0 43 16	0 45 43	0 48 14	0 50 52
13	0 21 44	0 23 11	0 24 44	0 26 22	0 28 0	0 29 51	0 31 44	0 33 43	0 35 47	0 37 55	0 40 10	0 42 27	0 44 50	0 47 18	0 49 52
14	0 21 26	0 22 51	0 24 21	0 25 57	0 27 32	0 29 22	0 31 12	0 33 8	0 35 9	0 37 14	0 39 26	0 41 40	0 44 0	0 46 25	0 48 55
15	0 21 8	0 22 31	0 23 59	0 25 33	0 27 4	0 28 53	0 30 41	0 32 34	0 34 32	0 36 34	0 38 43	0 40 54	0 43 11	0 45 33	0 47 59
16	0 20 50	0 22 12	0 23 38	0 25 9	0 26 39	0 28 24	0 30 10	0 32 0	0 33 55	0 35 54	0 38 0	0 40 8	0 42 22	0 44 41	0 47 4
17	0 20 33	0 21 53	0 23 17	0 24 46	0 26 15	0 27 56	0 29 39	0 31 27	0 33 19	0 35 15	0 37 18	0 39 23	0 41 35	0 43 51	0 46 11
18	0 20 16	0 21 34	0 22 57	0 24 24	0 25 52	0 27 29	0 29 10	0 30 55	0 32 45	0 34 38	0 36 38	0 38 41	0 40 50	0 43 3	0 45 20
19	0 20 0	0 21 16	0 22 37	0 24 2	0 25 29	0 27 3	0 28 42	0 30 25	0 32 12	0 34 3	0 36 0	0 38 1	0 40 6	0 42 16	0 44 30
20	0 19 44	0 20 58	0 22 17	0 23 40	0 25 6	0 26 38	0 28 15	0 29 55	0 31 40	0 33 29	0 35 23	0 37 21	0 39 23	0 41 30	0 43 41
21	0 19 28	0 20 39	0 21 58	0 23 19	0 24 43	0 26 13	0 27 48	0 29 26	0 31 9	0 32 56	0 34 47	0 36 43	0 38 42	0 40 46	0 42 54
22	0 19 13	0 20 21	0 21 40	0 22 59	0 24 21	0 25 49	0 27 22	0 28 58	0 30 39	0 32 23	0 34 12	0 36 5	0 38 2	0 40 3	0 42 8
23	0 18 58	0 20 3	0 21 22	0 22 39	0 24 0	0 25 26	0 26 56	0 28 30	0 30 9	0 31 51	0 33 37	0 35 28	0 37 22	0 39 21	0 41 23

LATITUDE 27° NORTH OR SOUTH.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 11 19	1 15 14	1 19 14	1 23 22	1 27 35	1 31 56	1 36 24	1 40 58	1 45 38	1 50 26	1 55 19	2 0 19	2 5 25	2 10 37	2 15 57
1	1 9 21	1 13 8	1 17 2	1 21 2	1 25 8	1 29 21	1 33 41	1 38 7	1 42 39	1 47 18	1 52 3	1 56 55	2 1 52	2 6 55	2 12 6
2	1 7 31	1 11 11	1 14 58	1 18 51	1 22 50	1 26 55	1 31 7	1 35 26	1 39 50	1 44 21	1 48 58	1 53 41	1 58 30	2 3 25	2 8 26
3	1 5 48	1 9 21	1 13 1	1 16 47	1 20 39	1 24 37	1 28 42	1 32 53	1 37 10	1 41 33	1 46 2	1 50 37	1 55 18	2 0 5	2 4 57
4	1 4 10	1 7 37	1 11 10	1 14 50	1 18 35	1 22 27	1 26 25	1 30 28	1 34 38	1 38 54	1 43 15	1 47 43	1 52 16	1 56 56	2 1 41
5	1 2 36	1 5 57	1 9 24	1 12 58	1 16 37	1 20 23	1 24 14	1 28 11	1 32 14	1 36 24	1 40 38	1 44 58	1 49 24	1 53 57	1 58 35
6	1 1 7	1 4 23	1 7 45	1 11 13	1 14 46	1 18 26	1 22 11	1 26 1	1 29 58	1 34 2	1 38 10	1 42 23	1 46 42	1 51 8	1 55 39
7	0 59 43	1 2 54	1 6 11	1 9 33	1 13 1	1 16 35	1 20 14	1 23 58	1 27 49	1 31 46	1 35 48	1 39 55	1 44 7	1 48 26	1 52 50
8	0 58 23	1 1 29	1 4 41	1 7 58	1 11 20	1 14 48	1 18 21	1 22 0	1 25 45	1 29 36	1 33 32	1 37 32	1 41 38	1 45 51	1 50 8
9	0 57 7	1 0 8	1 3 15	1 6 27	1 9 44	1 13 7	1 16 35	1 20 8	1 23 47	1 27 32	1 31 22	1 35 16	1 39 16	1 43 23	1 47 33
10	0 55 54	0 58 50	1 1 52	1 4 59	1 8 12	1 11 30	1 14 53	1 18 20	1 21 54	1 25 34	1 29 18	1 33 7	1 37 1	1 41 1	1 45 5
11	0 54 44	0 57 36	1 0 34	1 3 36	1 6 44	1 9 57	1 13 15	1 16 37	1 20 6	1 23 41	1 27 20	1 31 3	1 34 52	1 38 46	1 42 44
12	0 53 37	0 56 25	0 59 19	1 2 17	1 5 20	1 8 28	1 11 41	1 14 59	1 18 23	1 21 53	1 25 27	1 29 5	1 32 48	1 36 36	1 40 29
13	0 52 33	0 55 17	0 58 7	1 1 1	1 4 0	1 7 4	1 10 12	1 13 25	1 16 44	1 20 9	1 23 38	1 27 11	1 30 49	1 34 32	1 38 20
14	0 51 31	0 54 11	0 56 57	0 59 47	1 2 42	1 5 42	1 8 46	1 11 55	1 15 9	1 18 29	1 21 53	1 25 21	1 28 54	1 32 32	1 36 15
15	0 50 31	0 53 8	0 55 50	0 58 36	1 1 27	1 4 23	1 7 23	1 10 28	1 13 38	1 16 53	1 20 12	1 23 35	1 27 3	1 30 36	1 34 14
16	0 49 33	0 52 6	0 54 44	0 57 27	1 0 14	1 3 6	1 6 2	1 9 2	1 12 8	1 15 18	1 18 33	1 21 52	1 25 16	1 28 45	1 32 17
17	0 48 36	0 51 6	0 53 40	0 56 20	0 59 3	1 1 51	1 4 43	1 7 39	1 10 41	1 13 46	1 16 57	1 20 12	1 23 32	1 26 56	1 30 23
18	0 47 41	0 50 8	0 52 39	0 55 15	0 57 54	1 0 38	1 3 26	1 6 19	1 9 17	1 12 18	1 15 24	1 18 35	1 21 51	1 25 10	1 28 33
19	0 46 48	0 49 11	0 51 0	0 54 11	0 56 47	0 59 27	1 2 12	1 5 2	1 7 56	1 10 53	1 13 54	1 17 1	1 20 12	1 23 27	1 26 46
20	0 45 56	0 48 15	0 50 40	0 53 9	0 55 42	0 58 19	1 1 1	1 3 47	1 6 37	1 9 30	1 12 27	1 15 29	1 18 36	1 21 47	1 25 2
21	0 45 6	0 47 22	0 49 43	0 52 9	0 54 39	0 57 13	0 59 51	1 2 33	1 5 20	1 8 9	1 11 3	1 14 1	1 17 4	1 20 11	1 23 22
22	0 44 17	0 46 31	0 48 49	0 51 11	0 53 38	0 56 9	0 58 43	1 1 22	1 4 5	1 6 51	1 9 41	1 12 35	1 15 34	1 18 37	1 21 44
23	0 43 30	0 45 42	0 47 57	0 50 16	0 52 39	0 55 6	0 57 37	1 0 12	1 2 51	1 5 35	1 8 22	1 11 12	1 14 7	1 17 6	1 20 9

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	2 21 21	2 26 53	2 32 30	2 38 13	2 44 1	2 49 57	2 55 57	3 2 3	3 8 15	3 14 33	3 20 56	3 27 25	3 33 59	3 40 39	3 47 24
1	2 17 21	2 22 42	2 28 10	2 33 42	2 39 21	2 45 7	2 50 58	2 56 54	3 2 56	3 9 4	3 15 18	3 21 37	3 27 59	3 34 28	3 41 2
2	2 13 33	2 18 44	2 24 4	2 29 27	2 34 58	2 40 34	2 46 15	2 52 1	2 57 53	3 3 51	3 9 56	3 16 5	3 22 17	3 28 35	3 34 59
3	2 9 55	2 14 59	2 20 10	2 25 26	2 30 48	2 36 14	2 41 41	2 47 23	2 53 5	2 58 54	3 4 50	3 10 49	3 16 51	3 22 59	3 29 13
4	2 6 31	2 11 27	2 16 30	2 21 40	2 26 51	2 32 8	2 37 31	2 43 0	2 48 33	2 54 13	2 59 59	3 5 49	3 11 44	3 17 43	3 23 46
5	2 3 17	2 8 6	2 13 1	2 18 6	2 23 5	2 28 14	2 33 29	2 38 49	2 44 14	2 49 45	2 55 21	3 1 3	3 6 51	3 12 42	3 18 36
6	2 0 14	2 4 55	2 9 43	2 14 39	2 19 32	2 24 33	2 29 40	2 34 51	2 40 9	2 45 32	2 50 57	2 56 30	3 2 9	3 7 54	3 13 41
7	1 57 18	2 1 52	2 6 33	2 11 20	2 16 7	2 21 1	2 26 0	2 31 4	2 36 14	2 41 29	2 46 46	2 52 11	2 57 41	3 3 19	3 9 0
8	1 54 29	1 58 56	2 3 30	2 8 8	2 12 50	2 17 37	2 22 29	2 27 26	2 32 29	2 37 36	2 42 48	2 48 5	2 53 27	2 58 56	3 4 31
9	1 51 48	1 56 9	2 0 36	2 5 7	2 9 42	2 14 22	2 19 7	2 23 58	2 28 54	2 33 54	2 38 59	2 44 9	2 49 23	2 54 44	3 0 11
10	1 49 14	1 53 29	1 57 50	2 2 15	2 6 43	2 11 17	2 15 56	2 20 40	2 25 29	2 30 22	2 35 20	2 40 23	2 45 30	2 50 42	2 55 59
11	1 46 47	1 50 57	1 55 13	1 59 32	2 3 54	2 8 22	2 12 55	2 17 33	2 22 14	2 27 1	2 31 53	2 36 48	2 41 47	2 46 52	2 52 3
12	1 44 27	1 48 31	1 52 41	1 56 54	2 1 10	2 5 32	2 9 59	2 14 31	2 19 6	2 23 47	2 28 32	2 33 21	2 38 13	2 43 11	2 48 15
13	1 42 12	1 46 10	1 50 14	1 54 21	1 58 31	2 2 47	2 7 9	2 11 35	2 16 4	2 20 39	2 25 18	2 30 1	2 34 46	2 39 37	2 44 35
14	1 40 2	1 43 54	1 47 52	1 51 53	1 55 58	2 0 8	2 4 24	2 8 44	2 13 7	2 17 36	2 22 9	2 26 46	2 31 25	2 36 10	2 41 1
15	1 37 56	1 41 43	1 45 35	1 49 31	1 53 30	1 57 34	2 1 44	2 5 58	2 10 15	2 14 38	2 19 5	2 23 35	2 28 9	2 32 48	2 37 33
16	1 35 54	1 39 36	1 43 23	1 47 14	1 51 7	1 55 6	1 59 9	2 3 18	2 7 30	2 11 47	2 16 8	2 20 31	2 24 59	2 29 32	2 34 11
17	1 33 55	1 37 32	1 41 14	1 45 1	1 48 49	1 52 43	1 56 40	2 0 43	2 4 50	2 9 2	2 13 17	2 17 35	2 21 57	2 26 24	2 30 57
18	1 32 0	1 35 32	1 39 9	1 42 51	1 46 35	1 50 24	1 54 16	1 58 14	2 2 16	2 6 22	2 10 32	2 14 45	2 19 1	2 23 22	2 27 50
19	1 30 9	1 33 36	1 37 8	1 40 45	1 44 25	1 48 9	1 51 56	1 55 49	1 59 46	2 3 47	2 7 52	2 12 0	2 16 11	2 20 27	2 24 50
20	1 28 21	1 31 44	1 35 11	1 38 43	1 42 19	1 45 58	1 49 41	1 53 29	1 57 21	2 1 17	2 5 17	2 9 20	2 13 26	2 17 37	2 21 55
21	1 26 37	1 29 55	1 33 18	1 36 45	1 40 17	1 43 51	1 47 30	1 51 13	1 55 0	1 58 51	2 2 46	2 6 45	2 10 46	2 14 52	2 19 4
22	1 24 55	1 28 9	1 31 28	1 34 51	1 38 18	1 41 48	1 45 23	1 49 1	1 52 43	1 56 29	2 0 19	2 4 13	2 8 10	2 12 11	2 16 18
23	1 23 16	1 26 26	1 29 41	1 33 0	1 36 23	1 39 49	1 43 19	1 46 52	1 50 30	1 54 11	1 57 56	2 1 45	2 5 38	2 9 34	2 13 35

LATITUDE 28° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 47	0 10 58	0 11 16	0 11 42	0 12 18	0 12 55	0 13 44	0 14 40	0 15 42	0 16 52	0 18 9	0 19 33	0 21 5	0 22 44	0 24 31
1	0 10 48	0 10 59	0 11 18	0 11 45	0 12 21	0 13 1	0 13 51	0 14 49	0 15 54	0 17 6	0 18 26	0 19 52	0 21 27	0 23 10	0 25 0
2	0 10 50	0 11 1	0 11 20	0 11 48	0 12 24	0 13 7	0 13 59	0 14 58	0 16 6	0 17 20	0 18 43	0 20 12	0 21 51	0 23 37	0 25 30
3	0 10 51	0 11 3	0 11 23	0 11 52	0 12 28	0 13 13	0 14 7	0 15 8	0 16 19	0 17 35	0 19 1	0 20 33	0 22 16	0 24 6	0 26 3
4	0 10 53	0 11 5	0 11 26	0 11 56	0 12 33	0 13 20	0 14 16	0 15 19	0 16 32	0 17 52	0 19 20	0 20 57	0 22 44	0 24 38	0 26 39
5	0 10 54	0 11 7	0 11 29	0 12 0	0 12 38	0 13 28	0 14 25	0 15 31	0 16 46	0 18 11	0 19 41	0 21 23	0 23 14	0 25 13	0 27 18
6	0 10 56	0 11 8	0 11 31	0 12 4	0 12 44	0 13 36	0 14 35	0 15 44	0 17 2	0 18 30	0 20 4	0 21 50	0 23 46	0 25 50	0 28 1
7	0 10 57	0 11 10	0 11 34	0 12 8	0 12 50	0 13 44	0 14 46	0 15 58	0 17 19	0 18 50	0 20 29	0 22 19	0 24 19	0 26 29	0 28 46
8	0 10 58	0 11 12	0 11 37	0 12 12	0 12 57	0 13 53	0 14 58	0 16 12	0 17 37	0 19 12	0 20 55	0 22 49	0 24 54	0 27 10	0 29 34
9	0 11 0	0 11 15	0 11 40	0 12 17	0 13 6	0 14 4	0 15 11	0 16 27	0 17 58	0 19 37	0 21 26	0 23 24	0 25 36	0 27 56	0 30 27
10	0 11 2	0 11 18	0 11 43	0 12 23	0 13 15	0 14 15	0 15 25	0 16 45	0 18 23	0 20 6	0 22 1	0 24 6	0 26 25	0 28 50	0 31 27
11	0 11 3	0 11 20	0 11 47	0 12 29	0 13 23	0 14 26	0 15 41	0 17 6	0 18 48	0 20 37	0 22 39	0 24 51	0 27 17	0 29 50	0 32 34
12	0 11 5	0 11 23	0 11 51	0 12 35	0 13 31	0 14 38	0 15 58	0 17 28	0 19 14	0 21 10	0 23 19	0 25 39	0 28 13	0 30 55	0 33 48
13	0 11 7	0 11 26	0 11 55	0 12 41	0 13 40	0 14 51	0 16 16	0 17 52	0 19 43	0 21 46	0 24 2	0 26 30	0 29 12	0 32 5	0 35 8
14	0 11 8	0 11 28	0 12 1	0 12 49	0 13 53	0 15 9	0 16 38	0 18 19	0 20 19	0 22 29	0 24 52	0 27 30	0 30 21	0 33 25	0 36 40
15	0 11 10	0 11 30	0 12 8	0 12 57	0 14 6	0 15 28	0 17 5	0 18 52	0 21 2	0 23 21	0 25 51	0 28 39	0 31 41	0 34 57	0 38 28
16	0 11 12	0 11 34	0 12 15	0 13 10	0 14 24	0 15 51	0 17 35	0 19 31	0 21 48	0 24 20	0 27 1	0 30 1	0 33 15	0 36 45	0 40 32
17	0 11 14	0 11 38	0 12 22	0 13 23	0 14 42	0 16 17	0 18 7	0 20 16	0 22 40	0 25 26	0 28 22	0 31 36	0 35 5	0 38 53	0 42 54
18	0 11 16	0 11 42	0 12 29	0 13 34	0 15 0	0 16 42	0 18 44	0 21 7	0 23 47	0 26 41	0 29 53	0 33 27	0 37 14	0 41 20	0 45 41
19	0 11 18	0 11 45	0 12 38	0 13 48	0 15 29	0 17 19	0 19 36	0 22 10	0 25 2	0 28 27	0 31 51	0 35 39	0 39 49	0 44 20	0 49 4
20	0 11 20	0 11 50	0 12 59	0 14 11	0 15 56	0 18 8	0 20 34	0 23 26	0 26 44	0 30 17	0 34 10	0 38 29	0 43 15	0 47 54	0 53 5
21	0 11 22	0 11 56	0 13 8	0 14 37	0 16 37	0 18 59	0 21 46	0 24 58	0 28 41	0 32 40	0 37 8	0 41 50	0 46 58	0 52 32	0 58 16
22	0 11 26	0 12 10	0 13 26	0 15 12	0 17 33	0 20 16	0 23 30	0 27 9	0 31 20	0 35 56	0 40 53	0 46 20	0 52 3	0 58 18	1 4 51
23	0 11 30	0 12 21	0 13 48	0 15 52	0 18 41	0 21 52	0 25 48	0 29 59	0 34 52	0 40 14	0 46 5	0 52 14	0 58 50	1 5 59	1 13 25

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 47	0 10 58	0 11 16	0 11 42	0 12 18	0 12 55	0 13 44	0 14 40	0 15 42	0 16 52	0 18 9	0 19 33	0 21 5	0 22 44	0 24 31
1	0 10 46	0 10 57	0 11 13	0 11 38	0 12 13	0 12 49	0 13 37	0 14 31	0 15 32	0 16 40	0 17 54	0 19 15	0 20 44	0 22 20	0 24 3
2	0 10 45	0 10 55	0 11 10	0 11 35	0 12 8	0 12 44	0 13 30	0 14 22	0 15 22	0 16 28	0 17 40	0 18 58	0 20 24	0 21 57	0 23 36
3	0 10 43	0 10 53	0 11 8	0 11 32	0 12 3	0 12 39	0 13 23	0 14 14	0 15 12	0 16 16	0 17 26	0 18 41	0 20 5	0 21 35	0 23 11
4	0 10 41	0 10 51	0 11 6	0 11 29	0 11 59	0 12 34	0 13 16	0 14 6	0 15 2	0 16 4	0 17 12	0 18 25	0 19 47	0 21 15	0 22 48
5	0 10 39	0 10 49	0 11 4	0 11 26	0 11 55	0 12 29	0 13 10	0 13 58	0 14 53	0 15 53	0 16 59	0 18 10	0 19 30	0 20 56	0 22 26
6	0 10 38	0 10 47	0 11 2	0 11 23	0 11 51	0 12 24	0 13 4	0 13 51	0 14 44	0 15 42	0 16 46	0 17 56	0 19 14	0 20 37	0 22 5
7	0 10 36	0 10 45	0 11 0	0 11 20	0 11 47	0 12 20	0 12 59	0 13 44	0 14 35	0 15 32	0 16 34	0 17 43	0 18 58	0 20 19	0 21 45
8	0 10 34	0 10 42	0 10 57	0 11 17	0 11 43	0 12 16	0 12 54	0 13 38	0 14 27	0 15 22	0 16 23	0 17 30	0 18 43	0 20 2	0 21 26
9	0 10 33	0 10 41	0 10 56	0 11 15	0 11 41	0 12 13	0 12 50	0 13 32	0 14 20	0 15 14	0 16 14	0 17 19	0 18 30	0 19 47	0 21 9
10	0 10 32	0 10 40	0 10 55	0 11 13	0 11 40	0 12 10	0 12 46	0 13 26	0 14 14	0 15 7	0 16 5	0 17 9	0 18 18	0 19 33	0 20 53
11	0 10 30	0 10 38	0 10 52	0 11 10	0 11 36	0 12 5	0 12 41	0 13 19	0 14 7	0 14 58	0 15 54	0 16 57	0 18 4	0 19 17	0 20 35
12	0 10 28	0 10 36	0 10 49	0 11 7	0 11 31	0 12 0	0 12 35	0 13 13	0 13 59	0 14 49	0 15 44	0 16 45	0 17 51	0 19 2	0 20 18
13	0 10 26	0 10 34	0 10 46	0 11 3	0 11 27	0 11 55	0 12 29	0 13 7	0 13 51	0 14 40	0 15 34	0 16 33	0 17 38	0 18 47	0 20 1
14	0 10 24	0 10 32	0 10 44	0 11 0	0 11 24	0 11 51	0 12 24	0 13 1	0 13 44	0 14 32	0 15 24	0 16 22	0 17 25	0 18 33	0 19 46
15	0 10 22	0 10 29	0 10 41	0 10 58	0 11 20	0 11 47	0 12 19	0 12 56	0 13 38	0 14 25	0 15 15	0 16 11	0 17 12	0 18 20	0 19 31
16	0 10 20	0 10 27	0 10 39	0 10 55	0 11 17	0 11 43	0 12 14	0 12 50	0 13 31	0 14 16	0 15 6	0 16 1	0 17 0	0 18 7	0 19 16
17	0 10 17	0 10 24	0 10 36	0 10 51	0 11 13	0 11 39	0 12 9	0 12 44	0 13 24	0 14 8	0 14 57	0 15 51	0 16 49	0 17 54	0 19 1
18	0 10 14	0 10 21	0 10 33	0 10 48	0 11 9	0 11 34	0 12 3	0 12 39	0 13 18	0 14 0	0 14 48	0 15 42	0 16 39	0 17 41	0 18 47
19	0 10 12	0 10 19	0 10 30	0 10 45	0 11 6	0 11 31	0 11 59	0 12 34	0 13 12	0 13 53	0 14 40	0 15 33	0 16 28	0 17 29	0 18 33
20	0 10 10	0 10 17	0 10 26	0 10 42	0 11 2	0 11 27	0 11 54	0 12 28	0 13 6	0 13 47	0 14 33	0 15 24	0 16 18	0 17 17	0 18 19
21	0 10 8	0 10 15	0 10 24	0 10 39	0 10 59	0 11 23	0 11 50	0 12 22	0 13 0	0 13 40	0 14 25	0 15 15	0 16 7	0 17 5	0 18 6
22	0 10 6	0 10 12	0 10 22	0 10 36	0 10 56	0 11 19	0 11 46	0 12 17	0 12 54	0 13 33	0 14 17	0 15 6	0 15 56	0 16 53	0 17 54
23	0 10 3	0 10 9	0 10 19	0 10 33	0 10 52	0 11 15	0 11 42	0 12 12	0 12 47	0 13 26	0 14 10	0 14 56	0 15 46	0 16 42	0 17 42

LATITUDE 28° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 26 24	0 28 24	0 30 32	0 32 47	0 35 9	0 37 39	0 40 15	0 42 58	0 45 48	0 48 45	0 51 49	0 55 0	0 58 17	1 1 41	1 5 13
1	0 26 57	0 29 1	0 31 13	0 33 33	0 36 0	0 38 35	0 41 17	0 44 4	0 47 0	0 50 3	0 53 13	0 56 30	0 59 53	1 3 24	1 7 1
2	0 27 32	0 29 40	0 31 57	0 34 22	0 36 54	0 39 33	0 42 21	0 45 13	0 48 16	0 51 25	0 54 41	0 58 5	1 1 34	1 5 13	1 8 57
3	0 28 9	0 30 22	0 32 44	0 35 14	0 37 51	0 40 35	0 43 29	0 46 26	0 49 35	0 52 51	0 56 14	0 59 45	1 3 22	1 7 8	1 11 1
4	0 28 49	0 31 8	0 33 35	0 36 8	0 38 53	0 41 42	0 44 42	0 47 47	0 51 2	0 54 25	0 57 55	1 1 34	1 5 18	1 9 11	1 13 13
5	0 29 32	0 31 57	0 34 29	0 37 5	0 39 59	0 42 56	0 46 2	0 49 16	0 52 38	0 56 8	0 59 46	1 3 33	1 7 25	1 11 26	1 15 36
6	0 30 20	0 32 50	0 35 28	0 38 12	0 41 11	0 44 16	0 47 30	0 50 52	0 54 22	0 58 0	1 1 47	1 5 42	1 9 42	1 13 52	1 18 11
7	0 31 11	0 33 47	0 36 31	0 39 24	0 42 28	0 45 41	0 49 3	0 52 33	0 56 11	0 59 58	1 3 54	1 7 58	1 12 7	1 16 27	1 20 58
8	0 32 6	0 34 48	0 37 40	0 40 41	0 43 52	0 47 13	0 50 43	0 54 22	0 58 9	1 2 5	1 6 11	1 10 24	1 14 43	1 19 14	1 23 57
9	0 33 7	0 35 56	0 38 57	0 42 6	0 45 26	0 48 55	0 52 35	0 56 23	1 0 20	1 4 26	1 8 43	1 13 6	1 17 36	1 22 18	1 27 12
10	0 34 15	0 37 12	0 40 23	0 43 41	0 47 9	0 50 47	0 54 38	0 58 36	1 2 44	1 7 1	1 11 29	1 16 5	1 20 49	1 25 44	1 30 48
11	0 35 31	0 38 37	0 41 57	0 45 26	0 49 5	0 52 55	0 56 54	1 1 5	1 5 27	1 9 55	1 14 34	1 19 24	1 24 22	1 29 31	1 34 46
12	0 36 54	0 40 10	0 43 40	0 47 20	0 51 11	0 55 13	0 59 24	1 3 49	1 8 26	1 13 5	1 17 58	1 23 3	1 28 16	1 33 40	1 39 10
13	0 38 24	0 41 52	0 45 33	0 49 26	0 53 29	0 57 43	1 2 11	1 6 50	1 11 42	1 16 33	1 21 44	1 27 4	1 32 32	1 38 11	1 44 2
14	0 40 8	0 43 48	0 47 43	0 51 50	0 56 8	1 0 34	1 5 21	1 10 15	1 15 21	1 20 31	1 25 58	1 31 37	1 37 23	1 43 19	1 49 30
15	0 42 10	0 46 3	0 50 13	0 54 35	0 59 9	1 3 57	1 8 57	1 14 6	1 19 27	1 25 2	1 30 46	1 36 45	1 42 52	1 49 9	1 55 38
16	0 44 30	0 48 40	0 53 8	0 57 45	1 2 38	1 7 43	1 13 2	1 18 33	1 24 16	1 30 11	1 36 18	1 42 37	1 49 6	1 55 39	2 2 35
17	0 47 8	0 51 40	0 56 27	1 1 28	1 6 41	1 12 4	1 17 46	1 23 39	1 29 47	1 36 5	1 42 35	1 49 19	1 56 13	2 3 18	2 10 33
18	0 50 18	0 55 11	1 0 20	1 5 44	1 11 22	1 17 14	1 23 19	1 29 38	1 36 14	1 42 56	1 49 52	1 57 4	2 4 27	2 11 15	2 19 38
19	0 54 4	0 59 24	1 5 3	1 10 51	1 16 54	1 23 18	1 29 53	1 36 41	1 43 46	1 50 59	1 58 28	2 6 8	2 13 58	2 21 59	2 30 18
20	0 58 42	1 4 31	1 10 42	1 16 59	1 23 37	1 30 35	1 37 43	1 45 4	1 52 19	2 0 35	2 8 36	2 16 50	2 25 16	2 33 51	2 42 43
21	1 4 27	1 10 52	1 17 35	1 24 39	1 31 50	1 39 28	1 47 14	1 55 18	2 3 37	2 11 56	2 20 41	2 29 39	2 38 40	2 47 56	2 57 21
22	1 11 38	1 18 46	1 26 20	1 34 10	1 42 5	1 50 28	1 58 59	2 7 48	2 16 47	2 25 58	2 35 26	2 45 2	2 54 51	3 4 47	3 14 47
23	1 21 0	1 29 10	1 37 34	1 46 17	1 55 10	2 4 4	2 13 41	2 23 24	2 33 16	2 43 16	2 53 29	3 3 51	3 14 24	3 25 0	3 35 50

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 26 24	0 28 24	0 30 32	0 32 47	0 35 9	0 37 39	0 40 15	0 42 58	0 45 48	0 48 45	0 51 49	0 55 0	0 58 17	1 1 41	1 5 13
1	0 25 53	0 27 49	0 29 52	0 32 3	0 34 22	0 36 46	0 39 18	0 41 56	0 44 40	0 47 32	0 50 31	0 53 37	0 56 49	1 0 6	1 3 33
2	0 25 23	0 27 16	0 29 16	0 31 22	0 33 37	0 35 57	0 38 24	0 40 57	0 43 37	0 46 24	0 49 18	0 52 19	0 55 25	0 58 36	1 1 57
3	0 24 55	0 26 45	0 28 42	0 30 44	0 32 55	0 35 10	0 37 33	0 40 2	0 42 38	0 45 20	0 48 9	0 51 5	0 54 5	0 57 11	1 0 26
4	0 24 29	0 26 16	0 28 10	0 30 8	0 32 15	0 34 26	0 36 45	0 39 10	0 41 42	0 44 19	0 47 3	0 49 54	0 52 49	0 55 50	0 58 59
5	0 24 4	0 25 48	0 27 39	0 29 34	0 31 37	0 33 45	0 36 0	0 38 21	0 40 49	0 43 21	0 46 0	0 48 46	0 51 36	0 54 33	0 57 36
6	0 23 40	0 25 21	0 27 9	0 29 1	0 31 1	0 33 6	0 35 17	0 37 34	0 39 58	0 42 26	0 45 1	0 47 42	0 50 28	0 53 20	0 56 18
7	0 23 17	0 24 56	0 26 41	0 28 30	0 30 27	0 32 29	0 34 36	0 36 49	0 39 9	0 41 34	0 44 5	0 46 41	0 49 23	0 52 11	0 55 4
8	0 22 56	0 24 32	0 26 14	0 28 1	0 29 54	0 31 53	0 33 57	0 36 7	0 38 23	0 40 44	0 43 11	0 45 43	0 48 21	0 51 5	0 53 54
9	0 22 36	0 24 10	0 25 49	0 27 34	0 29 24	0 31 19	0 33 21	0 35 28	0 37 40	0 39 57	0 42 21	0 44 49	0 47 23	0 50 2	0 52 47
10	0 22 17	0 23 49	0 25 25	0 27 8	0 28 55	0 30 47	0 32 47	0 34 50	0 36 58	0 39 12	0 41 33	0 43 57	0 46 27	0 49 2	0 51 42
11	0 21 58	0 23 27	0 25 1	0 26 41	0 28 26	0 30 15	0 32 12	0 34 12	0 36 17	0 38 28	0 40 46	0 43 7	0 45 33	0 48 3	0 50 40
12	0 21 39	0 23 6	0 24 37	0 26 15	0 27 57	0 29 44	0 31 37	0 33 35	0 35 37	0 37 45	0 39 59	0 42 18	0 44 40	0 47 6	0 49 40
13	0 21 20	0 22 45	0 24 14	0 25 49	0 27 29	0 29 13	0 31 3	0 32 59	0 34 58	0 37 3	0 39 13	0 41 29	0 43 48	0 46 11	0 48 42
14	0 21 3	0 22 25	0 23 53	0 25 25	0 27 3	0 28 45	0 30 33	0 32 25	0 34 21	0 36 23	0 38 30	0 40 43	0 42 59	0 45 19	0 47 46
15	0 20 46	0 22 6	0 23 33	0 25 2	0 26 38	0 28 18	0 30 3	0 31 53	0 33 47	0 35 46	0 37 50	0 39 59	0 42 12	0 44 30	0 46 53
16	0 20 29	0 21 48	0 23 13	0 24 40	0 26 14	0 27 51	0 29 34	0 31 21	0 33 13	0 35 9	0 37 11	0 39 17	0 41 27	0 43 42	0 46 ?
17	0 20 13	0 21 30	0 22 53	0 24 18	0 25 50	0 27 25	0 29 6	0 30 50	0 32 40	0 34 33	0 36 32	0 38 35	0 40 42	0 42 54	0 45 11
18	0 19 59	0 21 13	0 22 33	0 23 57	0 25 27	0 26 59	0 28 38	0 30 20	0 32 7	0 33 58	0 35 54	0 37 54	0 39 59	0 42 8	0 44 22
19	0 19 42	0 20 56	0 22 15	0 23 37	0 25 4	0 26 35	0 28 12	0 29 52	0 31 33	0 33 25	0 35 18	0 37 16	0 39 18	0 41 24	0 43 35
20	0 19 28	0 20 39	0 21 57	0 23 18	0 24 42	0 26 12	0 27 46	0 29 24	0 31 0	0 32 52	0 34 43	0 36 39	0 38 38	0 40 41	0 42 49
21	0 19 14	0 20 23	0 21 39	0 22 59	0 24 21	0 25 48	0 27 21	0 28 57	0 30 33	0 32 21	0 34 9	0 36 2	0 37 59	0 39 59	0 42 4
22	0 19 1	0 20 8	0 21 22	0 22 40	0 24 0	0 25 24	0 26 56	0 28 30	0 30 6	0 31 50	0 33 36	0 35 26	0 37 21	0 39 19	0 41 21
23	0 18 48	0 19 53	0 21 5	0 22 21	0 23 40	0 25 1	0 26 31	0 28 4	0 29 40	0 31 20	0 33 4	0 34 51	0 36 43	0 38 39	0 40 39

LATITUDE 28° NORTH OR SOUTH.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 8 51	1 12 35	1 16 27	1 20 25	1 24 29	1 28 39	1 32 56	1 37 21	1 41 50	1 46 27	1 51 10	1 55 58	2 0 53	2 5 54	2 11 1
1	1 7 3	1 10 40	1 14 25	1 18 15	1 22 12	1 26 16	1 30 26	1 34 43	1 39 4	1 43 33	1 48 8	1 52 48	1 57 34	2 2 27	2 7 26
2	1 5 21	1 8 52	1 12 29	1 16 13	1 20 3	1 24 1	1 28 4	1 32 13	1 36 27	1 40 48	1 45 15	1 49 48	1 54 26	1 59 11	2 4 2
3	1 3 44	1 7 9	1 10 40	1 14 18	1 18 2	1 21 53	1 25 49	1 29 51	1 33 58	1 38 12	1 42 32	1 46 57	1 51 28	1 56 6	2 0 49
4	1 2 12	1 5 32	1 8 57	1 12 29	1 16 7	1 19 51	1 23 40	1 27 36	1 31 37	1 35 44	1 39 57	1 44 15	1 48 39	1 53 10	1 57 46
5	1 0 44	1 3 59	1 7 19	1 10 46	1 14 18	1 17 56	1 21 38	1 25 27	1 29 22	1 33 24	1 37 31	1 41 43	1 46 0	1 50 23	1 54 51
6	0 59 22	1 2 31	1 5 46	1 9 7	1 12 34	1 16 6	1 19 43	1 23 26	1 27 15	1 31 10	1 35 11	1 39 17	1 43 28	1 47 44	1 52 5
7	0 58 4	1 1 8	1 4 18	1 7 33	1 10 55	1 14 22	1 17 54	1 21 31	1 25 14	1 29 3	1 32 58	1 36 58	1 41 3	1 45 12	1 49 27
8	0 56 49	0 59 48	1 2 54	1 6 4	1 9 21	1 12 43	1 16 10	1 19 41	1 23 19	1 27 2	1 30 51	1 34 44	1 38 43	1 42 47	1 46 56
9	0 55 38	0 58 33	1 1 34	1 4 39	1 7 51	1 11 8	1 14 30	1 17 56	1 21 29	1 25 7	1 28 50	1 32 38	1 36 33	1 40 29	1 44 32
10	0 54 29	0 57 21	1 0 17	1 3 18	1 6 26	1 9 38	1 12 54	1 16 15	1 19 43	1 23 16	1 26 54	1 30 37	1 34 29	1 38 16	1 42 15
11	0 53 22	0 56 10	0 59 2	1 1 59	1 5 2	1 8 10	1 11 22	1 14 38	1 18 1	1 21 29	1 25 2	1 28 40	1 32 25	1 36 8	1 40 2
12	0 52 18	0 55 1	0 57 50	1 0 43	1 3 42	1 6 45	1 9 53	1 13 5	1 16 23	1 19 45	1 23 13	1 26 46	1 30 25	1 34 5	1 37 53
13	0 51 16	0 53 55	0 56 40	0 59 29	1 2 24	1 5 23	1 8 27	1 11 35	1 14 48	1 18 5	1 21 28	1 24 56	1 28 28	1 32 5	1 35 47
14	0 50 17	0 52 52	0 55 33	0 58 18	1 1 9	1 4 4	1 7 4	1 10 8	1 13 17	1 16 30	1 19 48	1 23 11	1 26 38	1 30 10	1 33 47
15	0 49 20	0 51 52	0 54 29	0 57 11	0 59 58	1 2 49	1 5 45	1 8 45	1 11 49	1 14 58	1 18 12	1 21 31	1 24 54	1 28 21	1 31 53
16	0 48 25	0 50 54	0 53 27	0 56 5	0 58 48	1 1 36	1 4 28	1 7 23	1 10 23	1 13 29	1 16 39	1 19 53	1 23 12	1 26 35	1 30 2
17	0 47 31	0 49 57	0 52 26	0 55 0	0 57 40	1 0 25	1 3 13	1 6 4	1 9 1	1 12 3	1 15 9	1 18 19	1 21 34	1 24 52	1 28 14
18	0 46 39	0 49 2	0 51 28	0 53 58	0 56 34	0 59 16	1 2 1	1 4 49	1 7 42	1 10 40	1 13 42	1 16 48	1 19 58	1 23 12	1 26 30
19	0 45 49	0 48 9	0 50 32	0 52 59	0 55 32	0 58 10	1 0 51	1 3 36	1 6 25	1 9 19	1 12 17	1 15 19	1 18 25	1 21 35	1 24 49
20	0 45 1	0 47 18	0 49 38	0 52 2	0 54 32	0 57 6	0 59 43	1 2 25	1 5 10	1 8 0	1 10 54	1 13 52	1 16 54	1 20 0	1 23 10
21	0 44 14	0 46 29	0 48 46	0 51 7	0 53 33	0 56 4	0 58 37	1 1 16	1 3 57	1 6 44	1 9 34	1 12 28	1 15 26	1 18 28	1 21 34
22	0 43 28	0 45 40	0 47 55	0 50 13	0 52 36	0 55 3	0 57 33	1 0 9	1 2 47	1 5 30	1 8 17	1 11 7	1 14 1	1 16 59	1 20 2
23	0 42 43	0 44 52	0 47 4	0 49 19	0 51 39	0 54 3	0 56 31	0 59 3	1 1 39	1 4 19	1 7 2	1 9 48	1 12 39	1 15 30	1 18 33

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	2 16 14	2 21 33	2 26 58	2 32 28	2 38 4	2 43 47	2 49 35	2 55 28	3 1 26	3 7 32	3 13 42	3 19 57	3 26 18	3 32 44	3 39 15
1	2 12 30	2 17 40	2 22 56	2 28 18	2 33 45	2 39 18	2 44 57	2 50 41	2 56 30	3 2 26	3 8 26	3 14 32	3 20 43	3 26 58	3 33 19
2	2 8 58	2 14 0	2 19 8	2 24 21	2 29 39	2 35 3	2 40 33	2 46 9	2 51 49	2 57 35	3 3 26	3 9 22	3 15 23	3 21 28	3 27 40
3	2 5 37	2 10 31	2 15 31	2 20 36	2 25 46	2 31 1	2 36 23	2 41 50	2 47 21	2 52 58	2 58 40	3 4 27	3 10 18	3 16 14	3 22 16
4	2 2 26	2 7 13	2 12 5	2 17 2	2 22 4	2 27 11	2 32 25	2 37 44	2 43 6	2 48 35	2 54 9	2 59 47	3 5 30	3 11 18	3 17 11
5	1 59 23	2 4 3	2 8 49	2 13 38	2 18 32	2 23 32	2 28 39	2 33 49	2 39 4	2 44 25	2 49 51	2 55 21	3 0 56	3 6 36	3 12 21
6	1 56 30	2 1 3	2 5 42	2 10 24	2 15 11	2 20 4	2 25 3	2 30 5	2 35 14	2 40 27	2 45 45	2 51 7	2 56 35	3 2 7	3 7 44
7	1 53 46	1 58 12	2 2 44	2 7 19	2 12 0	2 16 46	2 21 37	2 26 32	2 31 35	2 36 40	2 41 50	2 47 5	2 52 25	2 57 50	3 3 20
8	1 51 10	1 55 30	1 59 54	2 4 23	2 8 57	2 13 36	2 18 19	2 23 8	2 28 3	2 33 2	2 38 5	2 43 13	2 48 26	2 53 44	2 59 7
9	1 48 40	1 52 54	1 57 12	2 1 35	2 6 3	2 10 35	2 15 11	2 19 53	2 24 41	2 29 34	2 34 30	2 39 31	2 44 36	2 49 47	2 55 2
10	1 46 16	1 50 24	1 54 36	1 58 53	2 3 15	2 7 41	2 12 11	2 16 47	2 21 28	2 26 14	2 31 5	2 35 58	2 40 54	2 45 58	2 51 6
11	1 43 58	1 48 0	1 52 6	1 56 17	2 0 33	2 4 53	2 9 17	2 13 47	2 18 22	2 23 1	2 27 45	2 32 32	2 37 22	2 42 19	2 47 20
12	1 41 44	1 45 40	1 49 41	1 53 46	1 57 56	2 2 11	2 6 30	2 10 54	2 15 22	2 19 55	2 24 32	2 29 13	2 33 58	2 38 49	2 43 43
13	1 39 34	1 43 25	1 47 20	1 51 20	1 55 24	1 59 34	2 3 48	2 8 6	2 12 28	2 16 55	2 21 26	2 26 1	2 30 40	2 35 25	2 40 14
14	1 37 29	1 41 15	1 45 5	1 49 0	1 52 59	1 57 3	2 1 11	2 5 24	2 9 41	2 14 2	2 18 27	2 22 56	2 27 30	2 32 9	2 36 53
15	1 35 29	1 39 10	1 42 56	1 46 46	1 50 40	1 54 38	1 58 41	2 2 48	2 7 0	2 11 15	2 15 35	2 19 59	2 24 27	2 29 0	2 33 38
16	1 33 33	1 37 10	1 40 51	1 44 36	1 48 24	1 52 17	1 56 15	2 0 17	2 4 24	2 8 34	2 12 48	2 17 6	2 21 29	2 25 56	2 30 28
17	1 31 41	1 35 13	1 38 49	1 42 29	1 46 13	1 50 1	1 53 54	1 57 51	2 1 52	2 5 57	2 10 6	2 14 19	2 18 37	2 22 58	2 27 24
18	1 29 53	1 33 20	1 36 51	1 40 26	1 44 6	1 47 49	1 51 37	1 55 29	1 58 25	2 3 25	2 7 29	2 11 37	2 15 50	2 20 6	2 24 26
19	1 28 8	1 31 30	1 34 56	1 38 27	1 42 3	1 45 42	1 49 25	1 53 12	1 56 3	2 0 58	2 4 57	2 9 0	2 13 8	2 17 19	2 21 33
20	1 26 25	1 29 43	1 33 5	1 36 32	1 40 4	1 43 39	1 47 17	1 50 59	1 54 45	1 58 35	2 2 29	2 6 27	2 10 30	2 14 36	2 18 45
21	1 24 45	1 27 59	1 31 17	1 34 40	1 38 8	1 41 39	1 45 13	1 48 50	1 52 31	1 56 16	2 0 5	2 3 58	2 7 56	2 11 57	2 16 1
22	1 23 8	1 26 18	1 29 33	1 32 52	1 36 15	1 39 42	1 43 11	1 46 44	1 50 21	1 54 1	1 57 45	2 1 33	2 5 26	2 9 22	2 13 21
23	1 21 35	1 24 41	1 27 52	1 31 7	1 34 25	1 37 47	1 41 12	1 44 41	1 48 13	1 51 49	1 55 29	1 59 13	2 3 0	2 6 51	2 10 45

LATITUDE 29° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 45	0 10 56	0 11 14	0 11 38	0 12 10	0 12 50	0 13 36	0 14 29	0 15 29	0 16 36	0 17 50	0 19 12	0 20 39	0 22 14	0 23 56
1	0 10 47	0 10 57	0 11 16	0 11 41	0 12 14	0 12 55	0 13 42	0 14 37	0 15 39	0 16 47	0 18 3	0 19 28	0 20 58	0 22 36	0 24 22
2	0 10 48	0 10 59	0 11 18	0 11 44	0 12 19	0 13 1	0 13 49	0 14 46	0 15 50	0 17 0	0 18 18	0 19 46	0 21 19	0 23 0	0 24 51
3	0 10 50	0 11 1	0 11 20	0 11 48	0 12 24	0 13 7	0 13 57	0 14 56	0 16 2	0 17 14	0 18 35	0 20 6	0 21 43	0 23 27	0 25 23
4	0 10 51	0 11 3	0 11 23	0 11 52	0 12 29	0 13 13	0 14 5	0 15 6	0 16 15	0 17 30	0 18 54	0 20 28	0 22 9	0 23 57	0 25 58
5	0 10 53	0 11 5	0 11 26	0 11 56	0 12 34	0 13 20	0 14 14	0 15 17	0 16 28	0 17 47	0 19 15	0 20 52	0 22 37	0 24 29	0 26 35
6	0 10 55	0 11 7	0 11 28	0 12 0	0 12 40	0 13 27	0 14 23	0 15 28	0 16 42	0 18 4	0 19 36	0 21 17	0 23 7	0 25 4	0 27 14
7	0 10 56	0 11 9	0 11 31	0 12 4	0 12 46	0 13 34	0 14 32	0 15 40	0 16 57	0 18 23	0 19 59	0 21 44	0 23 39	0 25 41	0 27 55
8	0 10 58	0 11 11	0 11 34	0 12 8	0 12 52	0 13 42	0 14 42	0 15 53	0 17 13	0 18 43	0 20 23	0 22 13	0 24 13	0 26 20	0 28 39
9	0 10 59	0 11 13	0 11 37	0 12 12	0 12 58	0 13 51	0 14 54	0 16 8	0 17 31	0 19 5	0 20 50	0 22 44	0 24 49	0 27 1	0 29 25
10	0 11 1	0 11 16	0 11 40	0 12 17	0 13 5	0 14 1	0 15 8	0 16 25	0 17 52	0 19 30	0 21 20	0 23 19	0 25 28	0 27 45	0 30 14
11	0 11 3	0 11 18	0 11 44	0 12 22	0 13 13	0 14 12	0 15 23	0 16 45	0 18 16	0 19 58	0 21 52	0 23 56	0 26 12	0 28 35	0 31 10
12	0 11 4	0 11 20	0 11 48	0 12 28	0 13 22	0 14 24	0 15 39	0 17 6	0 18 42	0 20 29	0 22 28	0 24 37	0 27 0	0 29 31	0 32 14
13	0 11 6	0 11 22	0 11 52	0 12 34	0 13 31	0 14 37	0 15 56	0 17 28	0 19 10	0 21 3	0 23 8	0 25 23	0 27 53	0 30 33	0 33 25
14	0 11 7	0 11 25	0 11 56	0 12 40	0 13 41	0 14 51	0 16 14	0 17 51	0 19 41	0 21 41	0 23 53	0 26 16	0 28 55	0 31 44	0 34 46
15	0 11 9	0 11 28	0 12 1	0 12 47	0 13 51	0 15 7	0 16 34	0 18 16	0 20 15	0 22 25	0 24 45	0 27 17	0 30 5	0 33 6	0 36 19
16	0 11 10	0 11 31	0 12 6	0 12 54	0 14 4	0 15 25	0 16 58	0 18 45	0 20 53	0 23 14	0 25 45	0 28 29	0 31 28	0 34 43	0 38 14
17	0 11 11	0 11 34	0 12 12	0 13 3	0 14 19	0 15 46	0 17 26	0 19 20	0 21 38	0 24 11	0 26 54	0 29 51	0 33 3	0 36 33	0 40 24
18	0 11 13	0 11 37	0 12 19	0 13 14	0 14 37	0 16 10	0 17 59	0 20 2	0 22 31	0 25 17	0 28 13	0 31 24	0 34 51	0 38 37	0 42 49
19	0 11 15	0 11 40	0 12 28	0 13 28	0 14 59	0 16 39	0 18 39	0 20 53	0 23 34	0 26 34	0 29 44	0 33 11	0 36 56	0 41 0	0 45 35
20	0 11 17	0 11 44	0 12 38	0 13 47	0 15 27	0 17 15	0 19 28	0 21 55	0 24 50	0 28 6	0 31 33	0 35 18	0 39 25	0 43 50	0 48 51
21	0 11 20	0 11 51	0 12 51	0 14 10	0 16 0	0 18 0	0 20 27	0 23 19	0 25 32	0 30 10	0 34 1	0 38 9	0 42 43	0 47 37	0 52 58
22	0 11 23	0 12 0	0 13 7	0 14 37	0 16 39	0 18 57	0 21 42	0 24 57	0 28 33	0 32 38	0 36 59	0 41 35	0 46 42	0 52 11	0 57 58
23	0 11 26	0 12 10	0 13 26	0 15 9	0 17 24	0 20 9	0 23 16	0 26 51	0 30 56	0 35 35	0 40 32	0 45 44	0 51 30	0 57 35	1 4 1

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 45	0 10 56	0 11 14	0 11 38	0 12 10	0 12 50	0 13 36	0 14 29	0 15 29	0 16 36	0 17 50	0 19 12	0 20 39	0 22 14	0 23 56
1	0 10 44	0 10 55	0 11 12	0 11 35	0 12 6	0 12 45	0 13 30	0 14 22	0 15 20	0 16 26	0 17 37	0 18 55	0 20 20	0 21 53	0 23 32
2	0 10 43	0 10 54	0 11 10	0 11 32	0 12 2	0 12 40	0 13 24	0 14 15	0 15 11	0 16 16	0 17 24	0 18 39	0 20 2	0 21 32	0 23 9
3	0 10 42	0 10 53	0 11 8	0 11 29	0 11 58	0 12 35	0 13 18	0 14 8	0 15 3	0 16 6	0 17 12	0 18 24	0 19 45	0 21 12	0 22 47
4	0 10 41	0 10 52	0 11 6	0 11 26	0 11 55	0 12 30	0 13 12	0 14 1	0 14 55	0 15 56	0 17 0	0 18 9	0 19 28	0 20 53	0 22 25
5	0 10 40	0 10 50	0 11 4	0 11 23	0 11 52	0 12 26	0 13 6	0 13 54	0 14 47	0 15 46	0 16 48	0 17 55	0 19 12	0 20 35	0 22 4
6	0 10 39	0 10 48	0 11 2	0 11 20	0 11 49	0 12 22	0 13 1	0 13 47	0 14 39	0 15 36	0 16 36	0 17 42	0 18 57	0 20 18	0 21 44
7	0 10 38	0 10 46	0 11 0	0 11 18	0 11 46	0 12 18	0 12 56	0 13 40	0 14 31	0 15 26	0 16 25	0 17 30	0 18 43	0 20 2	0 21 25
8	0 10 36	0 10 44	0 10 58	0 11 16	0 11 43	0 12 14	0 12 51	0 13 33	0 14 23	0 15 16	0 16 14	0 17 18	0 18 29	0 19 46	0 21 7
9	0 10 34	0 10 42	0 10 56	0 11 14	0 11 40	0 12 10	0 12 46	0 13 27	0 14 15	0 15 7	0 16 4	0 17 7	0 18 16	0 19 31	0 20 50
10	0 10 32	0 10 40	0 10 54	0 11 12	0 11 37	0 12 6	0 12 41	0 13 21	0 14 7	0 14 58	0 15 54	0 16 56	0 18 3	0 19 16	0 20 33
11	0 10 30	0 10 38	0 10 52	0 11 10	0 11 34	0 12 2	0 12 36	0 13 15	0 14 0	0 14 50	0 15 45	0 16 46	0 17 51	0 19 2	0 20 17
12	0 10 28	0 10 36	0 10 50	0 11 8	0 11 31	0 11 58	0 12 31	0 13 9	0 13 53	0 14 42	0 15 36	0 16 36	0 17 39	0 18 48	0 20 1
13	0 10 26	0 10 34	0 10 48	0 11 6	0 11 28	0 11 54	0 12 26	0 13 3	0 13 46	0 14 34	0 15 27	0 16 26	0 17 28	0 18 35	0 19 46
14	0 10 24	0 10 32	0 10 46	0 11 2	0 11 25	0 11 50	0 12 21	0 12 57	0 13 39	0 14 26	0 15 18	0 16 16	0 17 17	0 18 22	0 19 31
15	0 10 22	0 10 30	0 10 44	0 10 59	0 11 22	0 11 46	0 12 16	0 12 51	0 13 33	0 14 18	0 15 9	0 16 6	0 17 6	0 18 9	0 19 16
16	0 10 20	0 10 28	0 10 41	0 10 56	0 11 19	0 11 42	0 12 11	0 12 46	0 13 27	0 14 11	0 15 0	0 15 56	0 16 55	0 17 56	0 19 2
17	0 10 18	0 10 26	0 10 38	0 10 53	0 11 15	0 11 38	0 12 6	0 12 41	0 13 21	0 14 4	0 14 52	0 15 46	0 16 44	0 17 44	0 18 49
18	0 10 16	0 10 24	0 10 35	0 10 50	0 11 11	0 11 34	0 12 2	0 12 36	0 13 15	0 13 57	0 14 44	0 15 36	0 16 33	0 17 32	0 18 36
19	0 10 14	0 10 21	0 10 32	0 10 47	0 11 7	0 11 30	0 11 58	0 12 31	0 13 9	0 13 50	0 14 36	0 15 26	0 16 22	0 17 20	0 18 23
20	0 10 12	0 10 18	0 10 29	0 10 44	0 11 3	0 11 26	0 11 54	0 12 26	0 13 3	0 13 43	0 14 28	0 15 17	0 16 11	0 17 8	0 18 10
21	0 10 10	0 10 15	0 10 26	0 10 41	0 11 0	0 11 22	0 11 50	0 12 21	0 12 57	0 13 36	0 14 20	0 15 8	0 16 0	0 16 56	0 17 57
22	0 10 7	0 10 12	0 10 23	0 10 38	0 10 56	0 11 18	0 11 45	0 12 16	0 12 51	0 13 29	0 14 12	0 14 59	0 15 50	0 16 45	0 17 44
23	0 10 4	0 10 10	0 10 20	0 10 34	0 10 52	0 11 14	0 11 40	0 12 10	0 12 44	0 13 22	0 14 4	0 14 50	0 15 40	0 16 34	0 17 32

LATITUDE 29° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 25 44	0 27 41	0 29 44	0 31 53	0 34 10	0 36 33	0 39 3	0 41 39	0 44 23	0 47 13	0 50 10	0 53 14	0 56 23	0 59 36	1 3 3
1	0 26 15	0 28 16	0 30 23	0 32 37	0 34 58	0 37 25	0 39 59	0 42 41	0 45 30	0 48 26	0 51 30	0 54 40	0 57 55	1 1 15	1 4 46
2	0 26 49	0 28 54	0 31 5	0 33 24	0 35 50	0 38 21	0 40 59	0 43 46	0 46 41	0 49 43	0 52 53	0 56 9	0 59 31	1 2 58	1 6 32
3	0 27 26	0 29 35	0 31 50	0 34 14	0 36 45	0 39 21	0 42 3	0 44 55	0 47 56	0 51 4	0 54 20	0 57 42	1 1 11	1 4 45	1 8 23
4	0 28 6	0 30 19	0 32 38	0 35 7	0 37 43	0 40 24	0 43 10	0 46 8	0 49 15	0 52 29	0 55 51	0 59 20	1 2 56	1 6 37	1 10 23
5	0 28 48	0 31 6	0 33 30	0 36 4	0 38 45	0 41 31	0 44 21	0 47 26	0 50 39	0 53 59	0 57 27	1 1 3	1 4 46	1 8 36	1 12 33
6	0 29 31	0 31 55	0 34 25	0 37 4	0 39 49	0 42 42	0 45 38	0 48 50	0 52 10	0 55 37	0 59 12	1 2 56	1 6 48	1 10 47	1 14 54
7	0 30 16	0 32 46	0 35 23	0 38 8	0 40 56	0 43 56	0 47 1	0 50 22	0 53 49	0 57 24	1 1 6	1 4 59	1 9 0	1 13 8	1 17 25
8	0 31 5	0 33 41	0 36 24	0 39 16	0 42 5	0 45 15	0 48 32	0 52 1	0 55 35	0 59 21	1 3 11	1 7 14	1 11 24	1 15 41	1 20 8
9	0 31 56	0 34 39	0 37 29	0 40 28	0 43 29	0 46 47	0 50 13	0 53 49	0 57 33	1 1 27	1 5 29	1 9 41	1 14 0	1 18 28	1 23 6
10	0 32 50	0 35 40	0 38 37	0 41 44	0 45 1	0 48 27	0 52 5	0 55 48	0 59 44	1 3 47	1 8 2	1 12 23	1 16 51	1 21 30	1 26 19
11	0 33 52	0 36 49	0 39 54	0 43 10	0 46 41	0 50 18	0 54 5	0 57 58	1 2 5	1 6 18	1 10 44	1 15 16	1 19 57	1 24 50	1 29 53
12	0 35 4	0 38 9	0 41 24	0 44 50	0 48 32	0 52 20	0 56 17	1 0 23	1 4 41	1 9 5	1 13 44	1 18 29	1 23 24	1 28 32	1 33 47
13	0 36 25	0 39 40	0 43 6	0 46 43	0 50 36	0 54 35	0 58 42	1 3 3	1 7 34	1 12 12	1 17 5	1 22 5	1 27 15	1 32 38	1 38 3
14	0 37 58	0 41 24	0 45 2	0 48 51	0 52 54	0 57 6	1 1 28	1 6 3	1 10 49	1 15 43	1 20 48	1 26 4	1 31 32	1 37 11	1 42 49
15	0 39 45	0 43 23	0 47 14	0 51 17	0 55 32	0 59 58	1 4 36	1 9 26	1 14 27	1 19 37	1 24 55	1 30 28	1 36 15	1 42 10	1 48 12
16	0 41 48	0 45 42	0 49 47	0 54 6	0 58 32	1 3 15	1 8 10	1 13 17	1 18 36	1 24 6	1 29 46	1 35 39	1 41 44	1 47 59	1 54 23
17	0 44 8	0 48 19	0 52 40	0 57 18	1 1 55	1 6 55	1 12 7	1 17 34	1 23 14	1 29 5	1 35 7	1 41 20	1 47 44	1 54 19	2 1 6
18	0 46 50	0 51 19	0 55 59	1 0 59	1 5 55	1 11 18	1 16 54	1 22 34	1 28 37	1 34 52	1 41 20	1 47 59	1 54 49	2 1 49	2 8 59
19	0 49 56	0 54 45	0 59 46	1 5 11	1 10 30	1 16 17	1 22 17	1 28 30	1 34 56	1 41 36	1 48 30	1 55 35	2 2 52	2 10 17	2 17 50
20	0 53 29	0 58 40	1 4 4	1 9 58	1 15 56	1 22 13	1 28 42	1 35 30	1 42 24	1 49 36	1 56 55	2 4 33	2 12 17	2 20 11	2 28 21
21	0 58 11	1 3 52	1 9 53	1 16 22	1 22 34	1 29 25	1 36 28	1 43 44	1 51 13	1 58 56	2 6 53	2 15 2	2 23 22	2 31 53	2 40 36
22	1 3 52	1 10 9	1 16 51	1 23 58	1 30 41	1 38 8	1 45 49	1 53 45	2 1 55	2 10 16	2 18 49	2 27 36	2 36 37	2 45 45	2 55 1
23	1 10 44	1 17 44	1 25 12	1 32 51	1 40 45	1 48 59	1 57 27	2 6 9	2 14 58	2 24 0	2 33 25	2 42 51	2 52 36	3 2 22	3 12 17

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 25 44	0 27 41	0 29 44	0 31 53	0 34 10	0 36 33	0 39 3	0 41 39	0 44 23	0 47 13	0 50 10	0 53 14	0 56 23	0 59 39	1 3 3
1	0 25 16	0 27 10	0 29 8	0 31 13	0 33 24	0 35 43	0 38 8	0 40 40	0 43 20	0 46 6	0 48 58	0 51 56	0 55 0	0 58 11	1 1 30
2	0 24 50	0 26 41	0 28 34	0 30 35	0 32 41	0 34 56	0 37 17	0 39 45	0 42 20	0 45 2	0 47 50	0 50 43	0 53 42	0 56 48	1 0 1
3	0 24 25	0 26 13	0 28 2	0 29 59	0 32 1	0 34 12	0 36 29	0 38 53	0 41 24	0 44 2	0 46 46	0 49 34	0 52 28	0 55 29	0 58 37
4	0 24 1	0 25 46	0 27 32	0 29 25	0 31 24	0 33 31	0 35 44	0 38 4	0 40 31	0 43 5	0 45 45	0 48 29	0 51 18	0 54 14	0 57 17
5	0 23 38	0 25 20	0 27 4	0 28 53	0 30 49	0 32 53	0 35 2	0 37 18	0 39 41	0 42 11	0 44 47	0 47 27	0 50 12	0 53 3	0 56 1
6	0 23 16	0 24 55	0 26 37	0 28 23	0 30 16	0 32 17	0 34 23	0 36 35	0 38 54	0 41 20	0 43 52	0 46 28	0 49 9	0 51 56	0 54 49
7	0 22 55	0 24 31	0 26 11	0 27 55	0 29 45	0 31 43	0 33 46	0 35 55	0 38 10	0 40 32	0 43 0	0 45 32	0 48 9	0 50 52	0 53 40
8	0 22 35	0 24 8	0 25 46	0 27 28	0 29 16	0 31 11	0 33 11	0 35 17	0 37 28	0 39 46	0 42 10	0 44 38	0 47 11	0 49 50	0 52 34
9	0 22 16	0 23 46	0 25 22	0 27 2	0 28 48	0 30 40	0 32 37	0 34 40	0 36 48	0 39 2	0 41 22	0 43 46	0 46 15	0 48 50	0 51 30
10	0 21 57	0 23 25	0 24 59	0 26 37	0 28 21	0 30 10	0 32 4	0 34 4	0 36 9	0 38 20	0 40 36	0 42 56	0 45 21	0 47 52	0 50 28
11	0 21 39	0 23 5	0 24 37	0 26 13	0 27 55	0 29 41	0 31 32	0 33 29	0 35 31	0 37 39	0 39 52	0 42 8	0 44 29	0 46 55	0 49 28
12	0 21 22	0 22 46	0 24 16	0 25 50	0 27 29	0 29 13	0 31 1	0 32 55	0 34 54	0 36 59	0 39 10	0 41 22	0 43 39	0 46 1	0 48 31
13	0 21 5	0 22 27	0 23 55	0 25 27	0 27 4	0 28 46	0 30 31	0 32 22	0 34 18	0 36 20	0 38 29	0 40 38	0 42 51	0 45 10	0 47 37
14	0 20 49	0 22 9	0 23 35	0 25 5	0 26 40	0 28 20	0 30 2	0 31 50	0 33 43	0 35 42	0 37 49	0 39 56	0 42 6	0 44 21	0 46 45
15	0 20 33	0 21 51	0 23 15	0 24 43	0 26 16	0 27 54	0 29 34	0 31 19	0 33 9	0 35 6	0 37 10	0 39 15	0 41 23	0 43 34	0 45 55
16	0 20 17	0 21 33	0 22 56	0 24 22	0 25 53	0 27 29	0 29 7	0 30 49	0 32 37	0 34 31	0 36 32	0 38 35	0 40 40	0 42 49	0 45 7
17	0 20 2	0 21 16	0 22 37	0 24 1	0 25 30	0 27 4	0 28 41	0 30 20	0 32 6	0 33 57	0 35 55	0 37 55	0 39 58	0 42 5	0 44 20
18	0 19 47	0 20 59	0 22 18	0 23 41	0 25 8	0 26 40	0 28 15	0 29 52	0 31 36	0 33 24	0 35 19	0 37 16	0 39 17	0 41 22	0 43 34
19	0 19 32	0 20 43	0 22 0	0 23 21	0 24 46	0 26 16	0 27 49	0 29 25	0 31 7	0 32 52	0 34 44	0 36 38	0 38 37	0 40 40	0 42 48
20	0 19 17	0 20 27	0 21 42	0 23 1	0 24 24	0 25 52	0 27 24	0 28 59	0 30 38	0 32 21	0 34 9	0 36 1	0 37 58	0 39 58	0 42 3
21	0 19 2	0 20 11	0 21 25	0 22 42	0 24 3	0 25 29	0 26 59	0 28 33	0 30 10	0 31 51	0 33 37	0 35 26	0 37 21	0 39 18	0 41 20
22	0 18 48	0 19 56	0 21 8	0 22 23	0 23 43	0 25 7	0 26 35	0 27 7	0 29 42	0 31 22	0 33 5	0 34 52	0 36 44	0 38 39	0 40 39
23	0 18 34	0 19 41	0 20 51	0 22 5	0 23 23	0 24 45	0 26 11	0 27 41	0 29 15	0 30 53	0 32 34	0 34 19	0 36 8	0 38 1	0 39 58

LATITUDE 29° NORTH OR SOUTH.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 6 32	1 10 9	1 13 51	1 17 40	1 21 34	1 25 36	1 29 43	1 33 57	1 38 17	1 42 43	1 47 15	1 51 53	1 56 36	2 1 26	2 6 20
1	1 4 56	1 8 26	1 12 1	1 15 43	1 19 31	1 23 26	1 27 26	1 31 32	1 35 45	1 40 5	1 44 30	1 49 0	1 53 37	1 58 20	2 3 8
2	1 3 24	1 6 48	1 10 17	1 13 52	1 17 34	1 21 22	1 25 15	1 29 13	1 33 20	1 37 34	1 41 52	1 46 15	1 50 45	1 55 21	2 0 2
3	1 1 56	1 5 15	1 8 37	1 12 6	1 15 42	1 19 24	1 23 10	1 27 1	1 31 2	1 35 10	1 39 21	1 43 38	1 48 1	1 52 30	1 57 5
4	1 0 32	1 3 46	1 7 2	1 10 25	1 13 55	1 17 31	1 21 11	1 24 56	1 28 51	1 32 53	1 36 56	1 41 7	1 45 24	1 49 46	1 54 15
5	0 59 11	1 2 20	1 5 31	1 8 49	1 12 13	1 15 43	1 19 18	1 22 58	1 26 47	1 30 43	1 34 38	1 38 43	1 42 54	1 47 10	1 51 33
6	0 57 53	1 0 57	1 4 4	1 7 17	1 10 35	1 14 0	1 17 30	1 21 5	1 24 48	1 28 38	1 32 27	1 36 26	1 40 31	1 44 41	1 48 58
7	0 56 38	0 59 37	1 2 40	1 5 49	1 9 2	1 12 22	1 15 47	1 19 17	1 22 54	1 26 38	1 30 22	1 34 15	1 38 14	1 42 18	1 46 29
8	0 55 26	0 58 20	1 1 19	1 4 24	1 7 33	1 10 48	1 14 8	1 17 33	1 21 5	1 24 43	1 28 22	1 32 9	1 36 2	1 40 0	1 44 5
9	0 54 16	0 57 6	1 0 1	1 3 2	1 6 7	1 9 18	1 12 33	1 15 53	1 19 20	1 22 52	1 26 24	1 30 8	1 33 55	1 37 47	1 41 46
10	0 53 8	0 55 55	0 58 47	1 1 43	1 4 44	1 7 51	1 11 2	1 14 17	1 17 39	1 21 5	1 24 36	1 28 12	1 31 53	1 35 39	1 39 29
11	0 52 3	0 54 47	0 57 35	1 0 27	1 3 25	1 6 28	1 9 35	1 12 55	1 16 3	1 19 23	1 22 49	1 26 20	1 29 56	1 33 37	1 37 23
12	0 51 1	0 53 42	0 56 26	0 59 15	1 2 10	1 5 8	1 8 11	1 11 27	1 14 31	1 17 46	1 21 7	1 24 33	1 28 4	1 31 40	1 35 22
13	0 50 2	0 52 40	0 55 20	0 58 6	1 0 57	1 3 51	1 6 50	1 10 2	1 13 2	1 16 13	1 19 30	1 22 51	1 26 17	1 29 48	1 33 26
14	0 49 6	0 51 41	0 54 17	0 56 59	0 59 47	1 2 37	1 5 32	1 8 40	1 11 36	1 14 43	1 17 56	1 21 13	1 24 34	1 28 0	1 31 34
15	0 48 13	0 50 44	0 53 16	0 55 55	0 58 39	1 1 25	1 4 17	1 7 21	1 10 13	1 13 16	1 16 25	1 19 38	1 22 55	1 26 17	1 29 46
16	0 47 22	0 49 49	0 52 18	0 54 53	0 57 33	1 0 15	1 3 4	1 6 5	1 8 53	1 11 52	1 14 57	1 18 6	1 21 19	1 24 37	1 28 1
17	0 46 33	0 48 56	0 51 22	0 53 53	0 56 29	0 59 8	1 1 53	1 4 51	1 7 35	1 10 31	1 13 32	1 16 37	1 19 46	1 23 0	1 26 19
18	0 45 45	0 48 5	0 50 28	0 52 55	0 55 27	0 58 3	1 0 44	1 3 29	1 6 19	1 9 12	1 12 9	1 15 10	1 18 15	1 21 25	1 24 39
19	0 44 58	0 47 15	0 49 35	0 51 59	0 54 27	0 57 0	0 59 37	1 2 19	1 5 5	1 7 55	1 10 48	1 13 45	1 16 46	1 19 52	1 23 2
20	0 44 12	0 46 26	0 48 43	0 51 4	0 53 29	0 55 59	0 58 33	1 1 11	1 3 53	1 6 40	1 9 29	1 12 22	1 15 19	1 18 21	1 21 27
21	0 43 27	0 45 38	0 47 52	0 50 10	0 52 32	0 54 59	0 57 29	1 0 4	1 2 43	1 5 27	1 8 12	1 11 2	1 13 55	1 16 53	1 19 55
22	0 42 43	0 44 51	0 47 2	0 49 18	0 51 37	0 54 0	0 56 27	0 58 59	1 1 35	1 4 15	1 6 57	1 9 44	1 12 34	1 15 28	1 18 26
23	0 41 59	0 44 5	0 46 14	0 48 27	0 50 43	0 53 3	0 55 27	0 57 56	1 0 28	1 3 4	1 5 44	1 8 28	1 11 15	1 14 6	1 17 0

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	2 11 24	2 16 32	2 21 46	2 27 4	2 32 28	2 37 59	2 43 34	2 49 16	2 55 2	3 0 54	3 6 52	3 12 55	3 19 2	3 25 15	3 31 33
1	2 8 1	2 13 2	2 18 7	2 23 19	2 28 24	2 33 47	2 39 14	2 44 48	2 50 25	2 56 8	3 1 57	3 7 52	3 13 50	3 19 53	3 26 3
2	2 4 48	2 9 42	2 14 38	2 19 44	2 24 34	2 29 49	2 35 7	2 40 33	2 46 2	2 51 36	2 57 17	3 3 3	3 8 53	3 14 47	3 20 49
3	2 1 43	2 6 30	2 11 18	2 16 17	2 20 56	2 26 3	2 31 13	2 36 31	2 41 52	2 47 18	2 52 51	2 58 28	3 4 10	3 9 56	3 15 49
4	1 58 45	2 3 25	2 8 6	2 12 58	2 17 30	2 22 29	2 27 32	2 32 42	2 37 55	2 43 13	2 48 38	2 54 7	2 59 41	3 5 19	3 11 3
5	1 55 54	2 0 27	2 5 1	2 9 46	2 14 16	2 19 8	2 24 4	2 29 5	2 34 10	2 39 21	2 44 38	2 49 59	2 55 24	3 0 54	3 6 30
6	1 53 10	1 57 36	2 2 3	2 6 41	2 11 12	2 15 57	2 20 45	2 25 39	2 30 37	2 35 41	2 40 49	2 46 1	2 51 19	2 56 41	3 2 9
7	1 50 33	1 54 52	1 59 13	2 3 44	2 8 15	2 12 53	2 17 33	2 22 20	2 27 12	2 32 9	2 37 9	2 42 14	2 47 25	2 52 40	2 57 59
8	1 48 3	1 52 15	1 56 31	2 0 55	2 5 23	2 9 54	2 14 27	2 19 7	2 23 54	2 28 44	2 33 37	2 38 36	2 43 40	2 48 48	2 53 59
9	1 45 40	1 49 46	1 53 57	1 58 14	2 2 36	2 7 0	2 11 28	2 16 2	2 20 43	2 25 26	2 30 13	2 35 6	2 40 3	2 45 4	2 50 8
10	1 43 24	1 47 24	1 51 30	1 55 40	1 59 54	2 4 12	2 8 35	2 13 3	2 17 37	2 22 14	2 26 56	2 31 43	2 36 34	2 41 28	2 46 25
11	1 41 14	1 45 8	1 49 8	1 53 13	1 57 18	2 1 30	2 5 48	2 10 10	2 14 38	2 19 9	2 23 45	2 28 26	2 33 12	2 38 0	2 42 51
12	1 39 9	1 42 57	1 46 51	1 50 51	1 54 49	1 58 56	2 3 8	2 7 25	2 11 47	2 16 12	2 20 41	2 25 17	2 29 57	2 34 39	2 39 26
13	1 37 8	1 40 51	1 44 39	1 48 34	1 52 26	1 56 28	2 0 35	2 4 47	2 9 3	2 13 22	2 17 45	2 22 15	2 26 49	2 31 26	2 36 8
14	1 35 11	1 38 49	1 42 32	1 46 22	1 50 9	1 54 6	1 58 8	2 2 15	2 6 25	2 10 38	2 14 55	2 19 19	2 23 48	2 28 20	2 32 56
15	1 33 18	1 36 51	1 40 29	1 44 14	1 47 57	1 51 49	1 55 46	1 59 48	2 3 53	2 8 0	2 12 11	2 16 29	2 20 54	2 25 21	2 29 50
16	1 31 28	1 34 56	1 38 30	1 42 10	1 45 50	1 49 37	1 53 29	1 57 26	2 1 26	2 5 28	2 9 34	2 13 46	2 18 5	2 22 26	2 26 50
17	1 29 47	1 33 5	1 36 35	1 40 10	1 43 47	1 47 29	1 51 16	1 55 8	1 59 3	2 3 1	2 7 2	2 11 9	2 15 22	2 19 37	2 23 55
18	1 27 57	1 31 17	1 34 43	1 38 13	1 41 47	1 45 25	1 49 7	1 52 54	1 56 44	2 0 38	2 4 34	2 8 36	2 12 44	2 16 54	2 21 6
19	1 26 16	1 29 32	1 32 54	1 36 20	1 39 50	1 43 24	1 47 1	1 40 43	1 54 29	1 58 19	2 2 11	2 6 8	2 10 10	2 14 15	2 18 22
20	1 24 37	1 27 50	1 31 8	1 34 30	1 37 56	1 41 26	1 44 59	1 48 36	1 52 18	1 56 4	1 59 52	2 3 44	2 7 40	2 11 40	2 15 42
21	1 23 2	1 26 11	1 29 25	1 32 43	1 36 5	1 39 31	1 43 0	1 46 32	1 50 10	1 53 52	1 57 36	2 1 23	2 5 14	2 9 9	2 13 7
22	1 21 29	1 24 35	1 27 45	1 30 59	1 34 17	1 37 39	1 41 4	1 44 32	1 48 5	1 51 42	1 55 22	1 59 5	2 2 51	2 6 42	2 10 36
23	1 19 59	1 23 2	1 26 8	1 29 18	1 32 32	1 35 49	1 39 10	1 42 34	1 46 2	1 49 34	1 53 10	1 56 49	2 0 31	2 4 18	2 8 9

LATITUDE 30° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 44	0 10 55	0 11 11	0 11 35	0 12 5	0 12 43	0 13 27	0 14 18	0 15 16	0 16 21	0 17 31	0 18 50	0 20 14	0 21 45	0 23 23
1	0 10 45	0 10 56	0 11 13	0 11 38	0 12 9	0 12 48	0 13 33	0 14 26	0 15 26	0 16 33	0 17 46	0 19 8	0 20 35	0 22 10	0 23 52
2	0 10 47	0 10 57	0 11 15	0 11 41	0 12 13	0 12 53	0 13 40	0 14 35	0 15 37	0 16 46	0 18 2	0 19 27	0 20 57	0 22 36	0 24 22
3	0 10 48	0 10 58	0 11 17	0 11 44	0 12 17	0 12 58	0 13 47	0 14 44	0 15 49	0 17 0	0 18 19	0 19 47	0 21 20	0 23 3	0 24 53
4	0 10 50	0 11 0	0 11 19	0 11 47	0 12 21	0 13 3	0 13 54	0 14 53	0 16 0	0 17 15	0 18 37	0 20 8	0 21 44	0 23 31	0 25 23
5	0 10 51	0 11 2	0 11 21	0 11 50	0 12 26	0 13 9	0 14 2	0 15 3	0 16 12	0 17 30	0 18 55	0 20 29	0 22 9	0 24 0	0 25 58
6	0 10 52	0 11 4	0 11 23	0 11 53	0 12 31	0 13 15	0 14 10	0 15 14	0 16 25	0 17 46	0 19 14	0 20 51	0 22 35	0 24 30	0 26 32
7	0 10 54	0 11 6	0 11 26	0 11 57	0 12 36	0 13 22	0 14 19	0 15 26	0 16 39	0 18 3	0 19 34	0 21 14	0 23 2	0 25 1	0 27 8
8	0 10 55	0 11 8	0 11 29	0 12 1	0 12 42	0 13 30	0 14 29	0 15 38	0 16 54	0 18 21	0 19 55	0 21 38	0 23 30	0 25 33	0 27 45
9	0 10 57	0 11 10	0 11 32	0 12 6	0 12 48	0 13 38	0 14 39	0 15 51	0 17 10	0 18 40	0 20 17	0 22 4	0 24 0	0 26 7	0 28 24
10	0 10 59	0 11 12	0 11 35	0 12 11	0 12 55	0 13 47	0 14 50	0 16 5	0 17 28	0 19 1	0 20 41	0 22 32	0 24 34	0 26 45	0 29 7
11	0 11 0	0 11 14	0 11 39	0 12 16	0 13 2	0 13 57	0 15 2	0 16 20	0 17 47	0 19 25	0 21 9	0 23 4	0 25 11	0 27 27	0 29 54
12	0 11 1	0 11 16	0 11 43	0 12 21	0 13 10	0 14 8	0 15 16	0 16 37	0 18 8	0 19 51	0 21 41	0 23 42	0 25 55	0 28 17	0 30 50
13	0 11 2	0 11 19	0 11 47	0 12 27	0 13 19	0 14 20	0 15 32	0 16 57	0 18 32	0 20 21	0 22 18	0 24 26	0 26 46	0 29 15	0 31 54
14	0 11 3	0 11 22	0 11 52	0 12 33	0 13 29	0 14 34	0 15 50	0 17 20	0 19 0	0 20 55	0 22 59	0 25 14	0 27 42	0 30 19	0 33 6
15	0 11 5	0 11 25	0 11 57	0 12 39	0 13 40	0 14 50	0 16 10	0 17 46	0 19 32	0 21 33	0 23 45	0 26 8	0 28 45	0 31 31	0 34 28
16	0 11 7	0 11 28	0 12 2	0 12 46	0 13 52	0 15 7	0 16 32	0 18 15	0 20 8	0 22 16	0 24 37	0 27 9	0 29 56	0 32 52	0 36 0
17	0 11 9	0 11 31	0 12 8	0 12 53	0 14 5	0 15 26	0 16 57	0 18 47	0 20 49	0 23 5	0 25 36	0 28 18	0 31 16	0 34 24	0 37 45
18	0 11 11	0 11 34	0 12 14	0 13 1	0 14 19	0 15 46	0 17 25	0 19 22	0 21 35	0 24 0	0 26 43	0 29 36	0 32 47	0 36 9	0 39 45
19	0 11 13	0 11 37	0 12 20	0 13 10	0 14 35	0 16 9	0 17 57	0 20 2	0 22 27	0 25 2	0 27 58	0 31 4	0 34 30	0 38 9	0 42 3
20	0 11 15	0 11 40	0 12 27	0 13 21	0 14 53	0 16 34	0 18 33	0 20 46	0 23 26	0 26 13	0 29 23	0 32 44	0 36 27	0 40 26	0 44 41
21	0 11 17	0 11 44	0 12 35	0 13 37	0 15 16	0 17 6	0 19 18	0 21 46	0 24 42	0 27 49	0 31 19	0 35 1	0 39 4	0 43 26	0 48 5
22	0 11 19	0 11 49	0 12 45	0 14 0	0 15 48	0 17 48	0 20 16	0 23 2	0 26 16	0 29 44	0 33 35	0 37 42	0 42 9	0 46 57	0 52 5
23	0 11 22	0 11 56	0 12 59	0 14 31	0 16 31	0 18 43	0 21 29	0 24 35	0 28 9	0 32 1	0 36 16	0 40 53	0 45 50	0 51 8	0 56 50

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 44	0 10 55	0 11 11	0 11 35	0 12 5	0 12 43	0 13 27	0 14 18	0 15 16	0 16 21	0 17 31	0 18 50	0 20 14	0 21 45	0 23 23
1	0 10 43	0 10 52	0 11 8	0 11 32	0 12 1	0 12 38	0 13 21	0 14 11	0 15 7	0 16 11	0 17 18	0 18 35	0 19 57	0 21 25	0 23 0
2	0 10 42	0 10 50	0 11 5	0 11 29	0 11 57	0 12 33	0 13 15	0 14 4	0 14 59	0 16 1	0 17 6	0 18 20	0 19 40	0 21 6	0 22 38
3	0 10 40	0 10 48	0 11 2	0 11 26	0 11 53	0 12 28	0 13 9	0 13 57	0 14 51	0 15 51	0 16 54	0 18 6	0 19 24	0 20 48	0 22 17
4	0 10 38	0 10 46	0 10 59	0 11 23	0 11 49	0 12 23	0 13 3	0 13 50	0 14 43	0 15 41	0 16 43	0 17 52	0 19 8	0 20 30	0 21 57
5	0 10 36	0 10 44	0 10 57	0 11 20	0 11 45	0 12 18	0 12 57	0 13 43	0 14 35	0 15 31	0 16 32	0 17 39	0 18 53	0 20 13	0 21 38
6	0 10 34	0 10 42	0 10 55	0 11 17	0 11 41	0 12 14	0 12 51	0 13 36	0 14 27	0 15 21	0 16 21	0 17 26	0 18 38	0 19 56	0 21 19
7	0 10 32	0 10 40	0 10 53	0 11 14	0 11 38	0 12 10	0 12 46	0 13 29	0 14 19	0 15 12	0 16 10	0 17 14	0 18 24	0 19 40	0 21 1
8	0 10 30	0 10 38	0 10 51	0 11 11	0 11 35	0 12 6	0 12 41	0 13 23	0 14 11	0 15 3	0 16 0	0 17 2	0 18 10	0 19 24	0 20 44
9	0 10 28	0 10 36	0 10 49	0 11 8	0 11 32	0 12 2	0 12 36	0 13 17	0 14 3	0 14 54	0 15 50	0 16 51	0 17 57	0 19 9	0 20 27
10	0 10 26	0 10 34	0 10 47	0 11 5	0 11 29	0 11 58	0 12 31	0 13 11	0 13 55	0 14 45	0 15 40	0 16 40	0 17 45	0 18 55	0 20 11
11	0 10 24	0 10 32	0 10 45	0 11 2	0 11 26	0 11 54	0 12 26	0 13 5	0 13 48	0 14 37	0 15 31	0 16 30	0 17 33	0 18 42	0 19 56
12	0 10 22	0 10 30	0 10 43	0 10 59	0 11 23	0 11 50	0 12 21	0 12 59	0 13 41	0 14 29	0 15 22	0 16 20	0 17 22	0 18 29	0 19 41
13	0 10 20	0 10 28	0 10 41	0 10 56	0 11 20	0 11 46	0 12 16	0 12 53	0 13 34	0 14 21	0 15 13	0 16 10	0 17 11	0 18 16	0 19 26
14	0 10 18	0 10 26	0 10 38	0 10 53	0 11 17	0 11 42	0 12 11	0 12 47	0 13 27	0 14 13	0 15 4	0 16 0	0 17 0	0 18 3	0 19 12
15	0 10 16	0 10 24	0 10 35	0 10 50	0 11 14	0 11 38	0 12 6	0 12 41	0 13 20	0 14 5	0 14 55	0 15 50	0 16 49	0 17 50	0 18 58
16	0 10 14	0 10 22	0 10 32	0 10 47	0 11 10	0 11 34	0 12 1	0 12 35	0 13 14	0 13 58	0 14 46	0 15 40	0 16 38	0 17 38	0 18 44
17	0 10 12	0 10 19	0 10 29	0 10 44	0 11 6	0 11 30	0 11 56	0 12 30	0 13 8	0 13 51	0 14 38	0 15 30	0 16 27	0 17 26	0 18 30
18	0 10 10	0 10 16	0 10 26	0 10 41	0 11 2	0 11 26	0 11 52	0 12 25	0 13 2	0 13 44	0 14 30	0 15 20	0 16 16	0 17 14	0 18 16
19	0 10 7	0 10 13	0 10 23	0 10 38	0 10 58	0 11 22	0 11 48	0 12 20	0 12 56	0 13 37	0 14 22	0 15 11	0 16 15	0 17 2	0 18 3
20	0 10 4	0 10 10	0 10 20	0 10 35	0 10 54	0 11 17	0 11 44	0 12 15	0 12 50	0 13 30	0 14 14	0 15 2	0 15 54	0 16 50	0 17 50
21	0 10 1	0 10 7	0 10 17	0 10 32	0 10 50	0 11 13	0 11 39	0 12 10	0 12 44	0 13 23	0 14 6	0 14 53	0 15 44	0 16 39	0 17 38
22	0 9 58	0 10 4	0 10 14	0 10 29	0 10 46	0 11 9	0 11 34	0 12 5	0 12 38	0 13 16	0 13 58	0 14 44	0 15 34	0 16 28	0 17 26
23	0 9 55	0 10 1	0 10 11	0 10 25	0 10 42	0 11 4	0 11 29	0 11 59	0 12 32	0 13 9	0 13 50	0 14 36	0 15 25	0 16 17	0 17 14

LATITUDE 30° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 25 8	0 26 59	0 28 57	0 31 1	0 33 13	0 35 30	0 37 54	0 40 26	0 43 2	0 45 46	0 48 36	0 51 32	0 54 34	0 57 43	1 0 58
1	0 25 41	0 27 36	0 29 38	0 31 47	0 33 53	0 36 14	0 38 43	0 41 19	0 44 0	0 46 49	0 49 45	0 52 46	0 55 54	0 59 9	1 2 31
2	0 26 15	0 28 14	0 30 20	0 32 34	0 34 37	0 37 2	0 39 36	0 42 17	0 45 3	0 47 57	0 50 59	0 54 6	0 57 20	1 0 41	1 4 9
3	0 26 50	0 28 53	0 31 4	0 33 23	0 35 25	0 37 55	0 40 34	0 43 20	0 46 12	0 49 11	0 52 19	0 55 32	0 58 52	1 2 19	1 5 55
4	0 27 26	0 29 33	0 31 49	0 34 13	0 36 18	0 38 53	0 41 37	0 44 28	0 47 26	0 50 31	0 53 45	0 57 4	1 0 31	1 4 4	1 7 45
5	0 28 3	0 30 14	0 32 35	0 35 4	0 37 17	0 39 57	0 42 46	0 45 42	0 48 46	0 51 57	0 55 17	0 58 42	1 2 16	1 5 56	1 9 44
6	0 28 41	0 30 57	0 33 23	0 35 57	0 38 20	0 41 7	0 44 3	0 47 6	0 50 17	0 53 29	0 56 57	1 0 30	1 4 12	1 8 0	1 11 52
7	0 29 21	0 31 42	0 34 13	0 36 52	0 39 26	0 42 20	0 45 23	0 48 33	0 51 51	0 55 7	0 58 43	1 2 25	1 6 15	1 10 11	1 14 8
8	0 30 3	0 32 29	0 35 5	0 37 50	0 40 35	0 43 36	0 46 46	0 50 3	0 53 28	0 56 53	1 0 37	1 4 28	1 8 26	1 12 30	1 16 36
9	0 30 47	0 33 19	0 36 0	0 38 51	0 41 48	0 44 56	0 48 13	0 51 38	0 55 11	0 58 47	1 2 39	1 6 39	1 10 46	1 14 58	1 19 17
10	0 31 35	0 34 12	0 37 2	0 39 59	0 43 5	0 46 21	0 49 45	0 53 18	0 56 59	1 0 49	1 4 49	1 8 58	1 13 14	1 17 36	1 22 11
11	0 32 28	0 35 10	0 38 5	0 41 7	0 44 29	0 47 56	0 51 31	0 55 15	0 59 7	1 3 9	1 7 18	1 11 37	1 16 3	1 20 36	1 25 19
12	0 33 29	0 36 16	0 39 17	0 42 24	0 46 5	0 49 43	0 53 29	0 57 24	1 1 27	1 5 41	1 10 0	1 14 30	1 19 7	1 23 52	1 28 52
13	0 34 39	0 37 33	0 40 40	0 43 54	0 47 55	0 51 44	0 55 41	0 59 47	1 4 2	1 8 28	1 12 59	1 17 41	1 22 31	1 27 30	1 32 36
14	0 35 59	0 39 1	0 42 16	0 45 38	0 49 59	0 53 59	0 58 7	1 2 24	1 6 51	1 11 29	1 16 14	1 21 10	1 26 15	1 31 29	1 36 52
15	0 37 30	0 40 42	0 44 7	0 47 39	0 52 18	0 56 29	1 0 49	1 5 18	1 9 57	1 14 47	1 19 47	1 24 59	1 30 22	1 35 52	1 41 31
16	0 39 14	0 42 38	0 46 15	0 49 59	0 54 53	0 59 15	1 3 52	1 8 35	1 13 29	1 18 35	1 23 52	1 29 20	1 35 0	1 40 49	1 46 47
17	0 41 12	0 44 51	0 48 43	0 52 42	0 57 48	1 2 17	1 7 17	1 12 18	1 17 32	1 22 57	1 28 33	1 34 20	1 40 18	1 46 26	1 52 43
18	0 43 28	0 47 25	0 51 35	0 55 53	1 1 6	1 6 2	1 11 11	1 16 35	1 22 9	1 27 54	1 33 50	1 39 38	1 46 17	1 52 47	1 59 27
19	0 46 5	0 50 24	0 54 57	0 59 39	1 5 0	1 10 17	1 15 48	1 21 33	1 27 30	1 33 38	1 39 58	1 46 32	1 53 16	2 0 9	2 7 11
20	0 49 6	0 53 52	0 58 54	1 4 6	1 9 37	1 15 16	1 21 11	1 27 21	1 33 43	1 40 17	1 47 2	1 54 0	2 1 14	2 8 32	2 16 0
21	0 52 54	0 58 4	1 3 34	1 9 15	1 14 57	1 21 8	1 27 33	1 34 12	1 41 3	1 48 6	1 55 22	2 2 51	2 10 33	2 18 23	2 26 20
22	0 57 24	1 3 4	1 9 4	1 15 17	1 21 30	1 28 12	1 35 8	1 42 18	1 49 43	1 57 20	2 5 8	2 13 9	2 21 24	2 29 49	2 38 23
23	1 2 44	1 8 59	1 15 32	1 22 21	1 29 30	1 36 46	1 44 24	1 52 12	2 0 14	2 8 34	2 16 53	2 25 39	2 34 31	2 43 27	2 52 38

NOTE.—In this Latitude, and with Declination of same name as Latitude, the Sun rises too rapidly to admit of reliable observations for Reduction to the Meridian being taken at a greater hour angle than 30 minutes.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 25 8	0 26 59	0 28 57	0 31 1	0 33 13	0 35 30	0 37 54	0 40 26	0 43 2	0 45 46	0 48 36	0 51 32	0 54 34	0 57 43	1 0 58
1	0 24 42	0 26 31	0 28 24	0 30 24	0 32 35	0 34 48	0 37 8	0 39 35	0 42 7	0 44 43	0 47 28	0 50 20	0 53 17	0 56 22	0 59 31
2	0 24 17	0 26 4	0 27 53	0 29 48	0 31 58	0 34 8	0 36 23	0 38 45	0 41 13	0 43 44	0 46 25	0 49 12	0 52 4	0 55 4	0 58 8
3	0 23 53	0 25 37	0 27 23	0 29 14	0 31 21	0 33 28	0 35 39	0 37 57	0 40 21	0 42 48	0 45 25	0 48 7	0 50 55	0 53 50	0 56 49
4	0 23 30	0 25 11	0 26 54	0 28 42	0 30 45	0 32 49	0 34 57	0 37 11	0 39 31	0 41 55	0 44 28	0 47 6	0 49 50	0 52 40	0 55 34
5	0 23 8	0 24 46	0 26 26	0 28 12	0 30 10	0 32 11	0 34 16	0 36 27	0 38 43	0 41 5	0 43 34	0 46 8	0 48 48	0 51 33	0 54 23
6	0 22 47	0 24 22	0 26 0	0 27 44	0 29 36	0 31 34	0 33 37	0 35 45	0 37 57	0 40 17	0 42 42	0 45 12	0 47 48	0 50 29	0 53 15
7	0 22 27	0 23 59	0 25 35	0 27 17	0 29 5	0 31 0	0 33 0	0 35 5	0 37 13	0 39 31	0 41 53	0 44 18	0 46 51	0 49 28	0 52 10
8	0 22 8	0 23 37	0 25 11	0 26 51	0 28 36	0 30 28	0 32 25	0 34 27	0 36 32	0 38 47	0 41 6	0 43 27	0 45 56	0 48 29	0 51 7
9	0 21 49	0 23 16	0 24 48	0 26 26	0 28 9	0 29 58	0 31 52	0 33 51	0 35 53	0 38 4	0 40 20	0 42 38	0 45 3	0 47 32	0 50 7
10	0 21 31	0 22 56	0 24 26	0 26 2	0 27 43	0 29 29	0 31 20	0 33 16	0 35 16	0 37 23	0 39 35	0 41 51	0 44 12	0 46 38	0 49 10
11	0 21 14	0 22 37	0 24 5	0 25 38	0 27 18	0 29 1	0 30 49	0 32 42	0 34 40	0 36 44	0 38 53	0 41 6	0 43 23	0 45 46	0 48 15
12	0 20 57	0 22 18	0 23 44	0 25 15	0 26 53	0 28 34	0 30 19	0 32 10	0 34 5	0 36 7	0 38 13	0 40 23	0 42 36	0 44 56	0 47 22
13	0 20 41	0 22 0	0 23 24	0 24 53	0 26 29	0 28 8	0 29 51	0 31 40	0 33 32	0 35 31	0 37 34	0 39 42	0 41 51	0 44 8	0 46 31
14	0 20 25	0 21 42	0 23 4	0 24 32	0 26 6	0 27 43	0 29 24	0 31 10	0 33 0	0 34 56	0 36 56	0 39 1	0 41 8	0 43 22	0 45 41
15	0 20 9	0 21 24	0 22 45	0 24 11	0 25 43	0 27 18	0 28 57	0 30 41	0 32 29	0 34 22	0 36 19	0 38 21	0 40 27	0 42 37	0 44 52
16	0 19 53	0 21 7	0 22 26	0 23 51	0 25 20	0 26 53	0 28 30	0 30 12	0 31 58	0 33 48	0 35 43	0 37 42	0 39 46	0 41 52	0 44 4
17	0 19 38	0 20 50	0 22 8	0 23 31	0 24 58	0 26 29	0 28 4	0 29 44	0 31 28	0 33 15	0 35 8	0 37 4	0 39 5	0 41 8	0 43 18
18	0 19 23	0 20 34	0 21 51	0 23 12	0 24 36	0 26 5	0 27 39	0 29 16	0 30 58	0 32 43	0 34 34	0 36 27	0 38 25	0 40 26	0 42 34
19	0 19 9	0 20 19	0 21 34	0 22 53	0 24 15	0 25 42	0 27 14	0 28 49	0 30 29	0 32 12	0 34 0	0 35 51	0 37 47	0 39 46	0 41 51
20	0 18 55	0 20 4	0 21 17	0 22 34	0 23 55	0 25 20	0 26 50	0 28 23	0 30 1	0 31 42	0 33 27	0 35 16	0 37 10	0 39 7	0 41 9
21	0 18 41	0 19 49	0 21 0	0 22 16	0 23 35	0 24 58	0 26 26	0 27 58	0 29 34	0 31 13	0 32 56	0 34 43	0 36 34	0 38 29	0 40 28
22	0 18 28	0 19 34	0 20 44	0 21 58	0 23 16	0 24 37	0 26 3	0 27 33	0 29 7	0 30 45	0 32 25	0 34 10	0 35 59	0 37 52	0 39 48
23	0 18 15	0 19 19	0 20 28	0 21 40	0 22 57	0 24 17	0 25 41	0 27 9	0 28 41	0 30 17	0 31 55	0 33 38	0 35 24	0 37 15	0 39 9

LATITUDE 30° NORTH OR SOUTH.

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 4 20	1 7 48	1 11 23	1 15 3	1 18 49	1 22 41	1 26 39	1 30 43	1 34 54	1 39 11	1 43 32	1 48 1	1 52 34	1 57 14	2 1 59
1	1 2 49	1 6 11	1 9 39	1 13 13	1 16 54	1 20 41	1 24 31	1 28 29	1 32 34	1 36 44	1 40 59	1 45 21	1 49 42	1 54 15	1 58 53
2	1 1 21	1 4 38	1 8 0	1 11 28	1 15 3	1 18 45	1 22 29	1 26 21	1 30 19	1 34 23	1 38 32	1 42 47	1 46 59	1 51 25	1 55 56
3	0 59 57	1 3 9	1 6 26	1 9 48	1 13 17	1 16 53	1 20 32	1 24 18	1 28 10	1 32 8	1 36 11	1 40 19	1 44 25	1 48 44	1 53 8
4	0 58 37	1 1 44	1 4 56	1 8 13	1 11 36	1 15 6	1 18 40	1 22 20	1 26 6	1 29 58	1 33 55	1 37 56	1 41 59	1 46 12	1 50 29
5	0 57 21	1 0 23	1 3 30	1 6 42	1 10 0	1 13 24	1 16 53	1 20 27	1 24 7	1 27 53	1 31 44	1 35 39	1 39 40	1 43 47	1 47 58
6	0 56 8	0 59 5	1 2 8	1 5 15	1 8 28	1 11 47	1 15 11	1 18 40	1 22 15	1 25 55	1 29 40	1 33 30	1 37 27	1 41 28	1 45 33
7	0 54 58	0 57 51	1 0 49	1 3 52	1 7 1	1 10 15	1 13 34	1 16 58	1 20 28	1 24 3	1 27 43	1 31 28	1 35 19	1 39 14	1 43 13
8	0 53 51	0 56 40	0 59 34	1 2 33	1 5 38	1 8 47	1 12 1	1 15 20	1 18 45	1 22 15	1 25 50	1 29 30	1 33 16	1 37 5	1 40 59
9	0 52 47	0 55 32	0 58 22	1 1 17	1 4 18	1 7 23	1 10 32	1 13 46	1 17 6	1 20 32	1 24 2	1 27 37	1 31 17	1 35 1	1 38 50
10	0 51 46	0 54 27	0 57 13	1 0 4	1 3 1	1 6 2	1 9 7	1 12 16	1 15 31	1 18 53	1 22 18	1 25 48	1 29 22	1 33 1	1 36 45
11	0 50 48	0 53 25	0 56 7	0 58 55	1 1 48	1 4 44	1 7 44	1 10 50	1 14 0	1 17 17	1 20 37	1 24 2	1 27 32	1 31 6	1 34 45
12	0 49 52	0 52 26	0 55 4	0 57 48	1 0 35	1 3 29	1 6 25	1 9 27	1 12 33	1 15 45	1 19 0	1 22 20	1 25 46	1 29 16	1 32 50
13	0 48 58	0 51 29	0 54 3	0 56 43	0 59 28	1 2 16	1 5 9	1 8 7	1 11 9	1 14 17	1 17 28	1 20 44	1 24 6	1 27 31	1 31 0
14	0 48 5	0 50 33	0 53 4	0 55 40	0 58 21	1 1 6	1 3 56	1 6 50	1 9 48	1 12 52	1 15 59	1 19 11	1 22 28	1 25 49	1 29 14
15	0 47 13	0 49 38	0 52 6	0 54 39	0 57 16	0 59 58	1 2 45	1 5 36	1 8 30	1 11 30	1 14 33	1 17 41	1 20 53	1 24 10	1 27 31
16	0 46 22	0 48 44	0 51 10	0 53 40	0 56 14	0 58 52	1 1 35	1 4 23	1 7 14	1 10 10	1 13 8	1 16 12	1 19 19	1 22 33	1 25 50
17	0 45 33	0 47 52	0 50 15	0 52 42	0 55 13	0 57 48	1 0 27	1 3 11	1 5 59	1 8 51	1 11 46	1 14 46	1 17 49	1 20 59	1 24 12
18	0 44 45	0 47 10	0 49 21	0 51 45	0 54 13	0 56 45	0 59 21	1 2 1	1 4 46	1 7 34	1 10 26	1 13 22	1 16 22	1 19 28	1 22 37
19	0 43 58	0 46 12	0 48 29	0 50 50	0 53 15	0 55 44	0 58 17	1 0 54	1 3 35	1 6 19	1 9 8	1 12 1	1 14 58	1 18 0	1 21 5
20	0 43 13	0 45 25	0 47 39	0 49 57	0 52 19	0 54 45	0 57 15	0 59 49	1 2 26	1 5 7	1 7 53	1 10 43	1 13 37	1 16 34	1 19 36
21	0 42 30	0 44 39	0 46 51	0 49 6	0 51 25	0 53 48	0 56 15	0 58 46	1 1 20	1 3 58	1 6 40	1 9 27	1 12 18	1 15 11	1 18 9
22	0 41 48	0 43 54	0 46 3	0 48 16	0 50 32	0 52 52	0 55 16	0 57 44	1 0 15	1 2 50	1 5 29	1 8 13	1 11 0	1 13 50	1 16 44
23	0 41 7	0 43 10	0 45 16	0 47 26	0 49 40	0 51 57	0 54 18	0 56 43	0 59 12	1 1 44	1 4 20	1 7 0	1 9 44	1 12 31	1 15 22

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	2 6 50	2 11 47	2 16 49	2 21 57	2 27 9	2 32 28	2 37 52	2 43 22	2 48 56	2 54 37	3 0 22	3 6 12	3 12 7	3 18 9	3 24 14
1	2 3 36	2 8 26	2 13 21	2 18 22	2 23 26	2 28 37	2 33 52	2 39 14	2 44 39	2 50 11	2 55 47	3 1 29	3 7 16	3 13 9	3 19 6
2	2 0 32	2 5 15	2 10 3	2 14 57	2 19 53	2 24 56	2 30 3	2 35 17	2 40 34	2 45 58	2 51 26	2 57 0	3 2 39	3 8 24	3 14 13
3	1 57 37	2 2 13	2 6 54	2 11 41	2 16 30	2 21 25	2 26 25	2 31 31	2 36 41	2 41 57	2 47 17	2 52 43	2 58 14	3 3 51	3 9 32
4	1 54 51	1 59 20	2 3 54	2 8 34	2 13 16	2 18 4	2 22 57	2 27 56	2 32 59	2 38 7	2 43 19	2 48 37	2 54 1	2 59 30	3 5 3
5	1 52 13	1 56 35	2 1 3	2 5 35	2 10 11	2 14 52	2 19 39	2 24 31	2 29 27	2 34 27	2 39 31	2 44 42	2 49 59	2 55 20	3 0 45
6	1 49 42	1 53 57	1 58 19	2 2 44	2 7 14	2 11 49	2 16 30	2 21 15	2 26 4	2 30 57	2 35 55	2 40 59	2 46 9	2 51 23	2 56 41
7	1 47 17	1 51 26	1 55 42	2 0 1	2 4 25	2 8 54	2 13 28	2 18 6	2 22 49	2 27 36	2 32 28	2 37 25	2 42 28	2 47 35	2 52 46
8	1 44 58	1 49 1	1 53 11	1 57 24	2 1 42	2 6 5	2 10 33	2 15 5	2 19 42	2 24 23	2 29 8	2 33 59	2 38 55	2 43 55	2 48 59
9	1 42 44	1 46 42	1 50 46	1 54 53	1 59 5	2 3 23	2 7 45	2 12 11	2 16 42	2 21 17	2 25 56	2 30 41	2 35 30	2 40 23	2 45 20
10	1 40 34	1 44 28	1 48 26	1 52 28	1 56 35	2 0 47	2 5 3	2 9 23	2 13 48	2 18 18	2 22 52	2 27 30	2 32 13	2 37 0	2 41 50
11	1 38 29	1 42 18	1 46 11	1 50 8	1 54 10	1 58 16	2 2 27	2 6 42	2 11 1	2 15 25	2 19 53	2 24 25	2 29 1	2 33 42	2 38 26
12	1 36 29	1 40 13	1 44 1	1 47 53	1 51 50	1 55 51	1 59 57	2 4 6	2 8 20	2 12 38	2 17 0	2 21 26	2 25 57	2 30 32	2 35 10
13	1 34 34	1 38 13	1 41 56	1 45 43	1 49 35	1 53 31	1 57 32	2 1 36	2 5 45	2 9 57	2 14 13	2 18 34	2 23 0	2 27 30	2 32 2
14	1 32 44	1 36 18	1 39 56	1 43 38	1 47 25	1 51 16	1 55 12	1 59 11	2 3 15	2 7 22	2 11 33	2 15 49	2 20 10	2 24 35	2 29 1
15	1 30 57	1 34 26	1 37 59	1 41 37	1 45 20	1 49 6	1 52 57	1 56 51	2 0 50	2 4 53	2 8 59	2 13 10	2 17 26	2 21 46	2 26 6
16	1 29 12	1 32 37	1 36 6	1 39 40	1 43 17	1 46 59	1 50 46	1 54 34	1 58 29	2 2 27	2 6 28	2 10 34	2 14 45	2 18 59	2 23 14
17	1 27 30	1 30 51	1 34 16	1 37 46	1 41 18	1 44 55	1 48 38	1 52 22	1 56 12	2 0 5	2 4 1	2 8 2	2 12 8	2 16 17	2 20 27
18	1 25 51	1 29 8	1 32 29	1 35 55	1 39 23	1 42 55	1 46 34	1 50 14	1 53 59	1 57 47	2 1 39	2 5 35	2 9 36	2 13 40	2 17 46
19	1 24 15	1 27 28	1 30 45	1 34 7	1 37 31	1 40 59	1 44 33	1 48 9	1 51 49	1 55 33	1 59 21	2 3 12	2 7 8	2 11 7	2 15 9
20	1 22 42	1 25 51	1 29 5	1 32 22	1 35 42	1 39 6	1 42 35	1 46 7	1 49 43	1 53 23	1 57 7	2 0 54	2 4 44	2 8 38	2 12 37
21	1 21 11	1 24 17	1 27 27	1 30 40	1 33 56	1 37 16	1 40 40	1 44 8	1 47 40	1 51 16	1 54 56	1 58 39	2 2 25	2 6 14	2 10 8
22	1 19 43	1 22 45	1 25 51	1 29 0	1 32 13	1 35 29	1 38 49	1 42 13	1 45 40	1 49 12	1 52 48	1 56 27	2 0 9	2 3 54	2 7 43
23	1 18 17	1 21 15	1 24 16	1 27 22	1 30 32	1 33 45	1 37 1	1 40 21	1 43 44	1 47 11	1 50 42	1 54 17	1 57 55	2 1 37	2 5 22

LATITUDE 31° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0	0 10 42	0 10 52	0 11 8	0 11 31	0 12 0	0 12 36	0 13 19	0 14 8	0 15 3	0 16 5	0 17 13	0 18 29	0 19 49	0 21 18	0 22 51
1	0 10 43	0 10 53	0 11 10	0 11 34	0 12 4	0 12 41	0 13 25	0 14 15	0 15 12	0 16 16	0 17 26	0 18 44	0 20 5	0 21 36	0 23 11
2	0 10 45	0 10 55	0 11 12	0 11 37	0 12 8	0 12 46	0 13 31	0 14 23	0 15 21	0 16 27	0 17 39	0 18 59	0 20 22	0 21 55	0 23 33
3	0 10 46	0 10 57	0 11 14	0 11 40	0 12 12	0 12 51	0 13 37	0 14 31	0 15 31	0 16 39	0 17 53	0 19 15	0 20 40	0 22 16	0 23 57
4	0 10 48	0 10 59	0 11 16	0 11 43	0 12 17	0 12 57	0 13 44	0 14 40	0 15 42	0 16 52	0 18 8	0 19 33	0 21 0	0 22 39	0 24 23
5	0 10 49	0 11 1	0 11 18	0 11 46	0 12 22	0 13 3	0 13 52	0 14 49	0 15 54	0 17 6	0 18 24	0 19 52	0 21 22	0 23 4	0 24 52
6	0 10 51	0 11 3	0 11 20	0 11 49	0 12 27	0 13 9	0 14 0	0 14 59	0 16 7	0 17 22	0 18 41	0 20 12	0 21 46	0 23 32	0 25 24
7	0 10 52	0 11 5	0 11 23	0 11 53	0 12 32	0 13 16	0 14 9	0 15 10	0 16 21	0 17 39	0 19 0	0 20 34	0 22 12	0 24 3	0 26 0
8	0 10 54	0 11 7	0 11 26	0 11 57	0 12 37	0 13 23	0 14 18	0 15 21	0 16 35	0 17 57	0 19 21	0 20 58	0 22 41	0 24 37	0 26 39
9	0 10 55	0 11 9	0 11 29	0 12 1	0 12 42	0 13 30	0 14 27	0 15 33	0 16 50	0 18 15	0 19 44	0 21 25	0 23 13	0 25 14	0 27 21
10	0 10 57	0 11 11	0 11 32	0 12 5	0 12 47	0 13 37	0 14 36	0 15 45	0 17 5	0 18 33	0 20 9	0 21 55	0 23 48	0 25 55	0 28 7
11	0 10 58	0 11 13	0 11 36	0 12 9	0 12 53	0 13 45	0 14 46	0 15 57	0 17 21	0 18 54	0 20 36	0 22 28	0 24 26	0 26 39	0 28 57
12	0 11 0	0 11 15	0 11 40	0 12 14	0 12 59	0 13 54	0 14 57	0 16 12	0 17 39	0 19 17	0 21 5	0 23 3	0 25 7	0 27 26	0 29 52
13	0 11 1	0 11 17	0 11 45	0 12 19	0 13 6	0 14 4	0 15 10	0 16 29	0 18 0	0 19 44	0 21 38	0 23 42	0 25 52	0 28 18	0 30 52
14	0 11 3	0 11 19	0 11 50	0 12 25	0 13 14	0 14 15	0 15 25	0 16 49	0 18 24	0 20 14	0 22 14	0 24 24	0 26 42	0 29 15	0 31 58
15	0 11 4	0 11 22	0 11 55	0 12 31	0 13 23	0 14 28	0 15 43	0 17 12	0 18 51	0 20 48	0 22 54	0 25 11	0 27 37	0 30 18	0 33 10
16	0 11 6	0 11 25	0 12 0	0 12 38	0 13 33	0 14 42	0 16 3	0 17 37	0 19 22	0 21 26	0 23 39	0 26 4	0 28 38	0 31 28	0 34 30
17	0 11 8	0 11 28	0 12 5	0 12 46	0 13 45	0 14 58	0 16 25	0 18 5	0 20 57	0 22 8	0 24 28	0 27 2	0 29 46	0 32 46	0 35 59
18	0 11 10	0 11 31	0 12 10	0 12 55	0 13 58	0 15 16	0 16 49	0 18 36	0 20 36	0 22 54	0 25 23	0 28 5	0 31 1	0 34 12	0 37 38
19	0 11 12	0 11 34	0 12 15	0 13 5	0 14 13	0 15 36	0 17 16	0 19 10	0 21 20	0 23 46	0 26 24	0 29 17	0 32 25	0 35 48	0 39 27
20	0 11 14	0 11 37	0 12 20	0 13 16	0 14 30	0 15 59	0 17 46	0 19 49	0 22 10	0 24 46	0 27 35	0 30 39	0 33 58	0 37 37	0 41 29
21	0 11 16	0 11 41	0 12 26	0 13 28	0 14 50	0 16 27	0 18 23	0 20 36	0 23 9	0 25 59	0 29 2	0 32 24	0 36 1	0 39 58	0 44 10
22	0 11 17	0 11 45	0 12 34	0 13 43	0 15 15	0 17 2	0 19 9	0 21 34	0 24 20	0 27 28	0 30 49	0 34 32	0 38 30	0 42 48	0 47 23
23	0 11 18	0 11 49	0 12 44	0 14 0	0 15 44	0 17 45	0 20 7	0 22 47	0 25 50	0 29 19	0 33 1	0 37 7	0 41 30	0 46 13	0 51 14

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 42	0 10 52	0 11 8	0 11 31	0 12 0	0 12 36	0 13 19	0 14 8	0 15 3	0 16 5	0 17 13	0 18 29	0 19 49	0 21 18	0 22 51
1	0 10 41	0 10 51	0 11 6	0 11 29	0 11 56	0 12 31	0 13 13	0 14 1	0 14 55	0 15 56	0 17 2	0 18 15	0 19 33	0 20 59	0 22 30
2	0 10 40	0 10 49	0 11 3	0 11 27	0 11 52	0 12 26	0 13 7	0 13 54	0 14 47	0 15 47	0 16 51	0 18 1	0 19 17	0 20 41	0 22 11
3	0 10 39	0 10 47	0 11 1	0 11 24	0 11 48	0 12 22	0 13 1	0 13 47	0 14 39	0 15 38	0 16 40	0 17 48	0 19 2	0 20 24	0 21 52
4	0 10 37	0 10 45	0 10 59	0 11 21	0 11 44	0 12 18	0 12 56	0 13 40	0 14 31	0 15 29	0 16 29	0 17 35	0 18 47	0 20 7	0 21 33
5	0 10 35	0 10 43	0 10 56	0 11 18	0 11 41	0 12 14	0 12 51	0 13 34	0 14 23	0 15 20	0 16 18	0 17 23	0 18 33	0 19 51	0 21 15
6	0 10 33	0 10 41	0 10 54	0 11 15	0 11 38	0 12 10	0 12 46	0 13 28	0 14 15	0 15 11	0 16 8	0 17 11	0 18 19	0 19 35	0 20 57
7	0 10 31	0 10 39	0 10 52	0 11 12	0 11 35	0 12 6	0 12 41	0 13 22	0 14 8	0 15 2	0 15 58	0 17 0	0 18 6	0 19 20	0 20 40
8	0 10 29	0 10 37	0 10 50	0 11 9	0 11 32	0 12 2	0 12 36	0 13 16	0 14 1	0 14 53	0 15 48	0 16 49	0 17 54	0 19 5	0 20 23
9	0 10 27	0 10 35	0 10 47	0 11 6	0 11 29	0 11 58	0 12 31	0 13 10	0 13 54	0 14 44	0 15 38	0 16 38	0 17 42	0 18 51	0 20 7
10	0 10 25	0 10 33	0 10 45	0 11 3	0 11 26	0 11 54	0 12 26	0 13 4	0 13 47	0 14 35	0 15 28	0 16 27	0 17 30	0 18 38	0 19 51
11	0 10 23	0 10 31	0 10 43	0 11 0	0 11 23	0 11 50	0 12 21	0 12 58	0 13 40	0 14 27	0 15 19	0 16 17	0 17 19	0 18 25	0 19 37
12	0 10 21	0 10 29	0 10 41	0 10 57	0 11 20	0 11 46	0 12 16	0 12 54	0 13 33	0 14 19	0 15 10	0 16 7	0 17 8	0 18 12	0 19 23
13	0 10 19	0 10 27	0 10 39	0 10 54	0 11 17	0 11 42	0 12 11	0 12 48	0 13 26	0 14 12	0 15 2	0 15 57	0 16 57	0 18 0	0 19 9
14	0 10 17	0 10 25	0 10 36	0 10 51	0 11 14	0 11 38	0 12 6	0 12 42	0 13 20	0 14 5	0 14 54	0 15 47	0 16 46	0 17 48	0 18 56
15	0 10 15	0 10 23	0 10 33	0 10 48	0 11 10	0 11 34	0 12 1	0 12 37	0 13 14	0 13 58	0 14 46	0 15 38	0 16 35	0 17 36	0 18 43
16	0 10 13	0 10 20	0 10 30	0 10 45	0 11 6	0 11 30	0 11 56	0 12 32	0 13 8	0 13 51	0 14 38	0 15 29	0 16 24	0 17 24	0 18 30
17	0 10 11	0 10 17	0 10 27	0 10 42	0 11 2	0 11 26	0 11 51	0 12 27	0 13 2	0 13 44	0 14 30	0 15 20	0 16 14	0 17 12	0 18 17
18	0 10 8	0 10 14	0 10 24	0 10 39	0 10 58	0 11 22	0 11 47	0 12 22	0 12 56	0 13 37	0 14 22	0 15 11	0 16 4	0 17 1	0 18 4
19	0 10 5	0 10 11	0 10 21	0 10 36	0 10 54	0 11 18	0 11 43	0 12 16	0 12 50	0 13 30	0 14 14	0 15 2	0 15 54	0 16 50	0 17 51
20	0 10 2	0 10 8	0 10 18	0 10 32	0 10 50	0 11 13	0 11 39	0 12 10	0 12 44	0 13 23	0 14 6	0 14 53	0 15 44	0 16 39	0 17 38
21	0 9 59	0 10 5	0 10 15	0 10 28	0 10 46	0 11 9	0 11 34	0 12 5	0 12 38	0 13 16	0 13 58	0 14 44	0 15 34	0 16 28	0 17 25
22	0 9 56	0 10 2	0 10 12	0 10 24	0 10 42	0 11 4	0 11 29	0 11 59	0 12 32	0 13 9	0 13 50	0 14 35	0 15 24	0 16 17	0 17 13
23	0 9 52	0 9 58	0 10 8	0 10 21	0 10 38	0 10 59	0 11 24	0 11 53	0 12 26	0 13 2	0 13 42	0 14 26	0 15 14	0 16 6	0 17 1

LATITUDE 31° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 24 32	0 26 19	0 28 13	0 30 12	0 32 18	0 34 31	0 36 49	0 39 14	0 41 45	0 44 23	0 47 6	0 49 56	0 52 51	0 55 53	0 59 1
1	0 24 55	0 26 46	0 28 43	0 30 46	0 32 53	0 35 10	0 37 32	0 40 2	0 42 38	0 45 21	0 48 8	0 51 3	0 54 6	0 57 13	1 0 30
2	0 25 20	0 27 15	0 29 16	0 31 22	0 33 33	0 35 54	0 38 21	0 40 56	0 43 36	0 46 24	0 49 16	0 52 16	0 55 25	0 58 38	1 2 2
3	0 25 47	0 27 46	0 29 51	0 32 1	0 34 18	0 36 43	0 39 15	0 41 55	0 44 40	0 47 33	0 50 30	0 53 36	0 56 49	1 0 8	1 3 37
4	0 26 16	0 28 19	0 30 28	0 32 42	0 35 8	0 37 38	0 40 15	0 42 59	0 45 49	0 48 48	0 51 50	0 55 2	0 58 20	1 1 45	1 5 18
5	0 26 48	0 28 55	0 31 8	0 33 27	0 36 3	0 38 38	0 41 20	0 44 9	0 47 4	0 50 9	0 53 16	0 56 34	0 59 58	1 3 29	1 7 7
6	0 27 23	0 29 34	0 31 52	0 34 16	0 37 1	0 39 41	0 42 29	0 45 25	0 48 26	0 51 37	0 54 51	0 58 16	1 1 43	1 5 22	1 9 4
7	0 28 2	0 30 17	0 32 40	0 35 10	0 38 1	0 40 46	0 43 40	0 46 43	0 49 51	0 53 9	0 56 30	1 0 2	1 3 35	1 7 22	1 11 9
8	0 28 45	0 31 5	0 33 33	0 36 9	0 39 4	0 41 54	0 44 55	0 48 5	0 51 19	0 54 44	0 58 13	1 1 53	1 5 34	1 9 29	1 13 22
9	0 29 33	0 31 58	0 34 31	0 37 13	0 40 10	0 43 6	0 46 14	0 49 31	0 52 52	0 56 24	1 0 1	1 3 49	1 7 40	1 11 43	1 15 46
10	0 30 26	0 32 56	0 35 35	0 38 24	0 41 20	0 44 23	0 47 38	0 51 2	0 54 30	0 58 9	1 1 55	1 5 51	1 9 55	1 14 6	1 18 23
11	0 31 23	0 34 0	0 36 46	0 39 41	0 42 32	0 45 43	0 49 5	0 52 38	0 56 16	1 0 3	1 3 57	1 8 4	1 12 19	1 16 42	1 21 14
12	0 32 25	0 35 10	0 38 4	0 41 6	0 43 56	0 47 17	0 50 47	0 54 29	0 58 17	1 2 13	1 6 18	1 10 37	1 15 2	1 19 37	1 24 20
13	0 33 33	0 36 27	0 39 30	0 42 40	0 45 33	0 49 6	0 52 44	0 56 36	1 0 35	1 4 42	1 8 58	1 13 27	1 18 3	1 22 50	1 27 44
14	0 34 48	0 37 51	0 41 4	0 44 23	0 47 24	0 51 11	0 54 57	0 58 59	1 3 9	1 7 29	1 11 57	1 16 37	1 21 25	1 26 24	1 31 30
15	0 36 10	0 39 23	0 42 47	0 46 17	0 49 30	0 53 32	0 57 26	1 1 38	1 5 59	1 10 33	1 15 15	1 20 7	1 25 8	1 30 19	1 35 38
16	0 37 41	0 41 5	0 44 41	0 48 24	0 51 49	0 56 2	1 0 11	1 4 36	1 9 10	1 13 57	1 18 54	1 24 0	1 29 18	1 34 46	1 40 23
17	0 39 22	0 42 58	0 46 48	0 50 45	0 54 21	0 58 45	1 3 11	1 7 51	1 12 41	1 17 43	1 22 56	1 28 19	1 33 54	1 39 40	1 45 27
18	0 41 13	0 45 3	0 49 7	0 53 20	0 57 7	1 1 42	1 6 28	1 11 25	1 16 33	1 21 53	1 27 25	1 33 7	1 38 59	1 45 3	1 51 17
19	0 43 15	0 47 20	0 51 39	0 56 9	1 0 22	1 5 28	1 10 21	1 15 37	1 21 5	1 26 45	1 32 37	1 38 39	1 44 53	1 51 17	1 57 52
20	0 45 31	0 49 50	0 54 25	0 59 14	1 4 12	1 9 26	1 14 49	1 20 31	1 26 20	1 32 24	1 38 38	1 45 4	1 51 53	1 58 28	2 5 28
21	0 48 33	0 53 12	0 58 7	1 3 16	1 8 38	1 14 15	1 20 5	1 26 8	1 32 24	1 38 53	1 45 34	1 52 26	1 59 31	2 6 44	2 14 6
22	0 52 11	0 57 13	1 2 34	1 8 7	1 13 54	1 20 1	1 26 20	1 32 53	1 39 39	1 46 35	1 53 44	2 1 5	2 8 38	2 16 22	2 24 16
23	0 56 30	1 2 0	1 7 53	1 13 54	1 20 18	1 26 53	1 33 44	1 40 51	1 48 11	1 55 40	2 3 21	2 11 17	2 19 23	2 27 39	2 36 8

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 24 32	0 26 19	0 28 13	0 30 12	0 32 18	0 34 31	0 36 49	0 39 14	0 41 45	0 44 23	0 47 6	0 49 56	0 52 51	0 55 53	0 59 1
1	0 24 8	0 25 52	0 27 44	0 29 38	0 31 40	0 33 49	0 36 4	0 38 25	0 40 52	0 43 26	0 46 6	0 48 50	0 51 41	0 54 37	0 57 41
2	0 23 45	0 25 26	0 27 16	0 29 6	0 31 4	0 33 10	0 35 22	0 37 39	0 40 2	0 42 31	0 45 7	0 47 47	0 50 34	0 53 25	0°56 24
3	0 23 23	0 25 1	0 26 49	0 28 35	0 30 30	0 32 33	0 34 42	0 36 55	0 39 14	0 41 39	0 44 11	0 46 47	0 49 30	0 52 17	0 55 11
4	0 23 1	0 24 37	0 26 22	0 28 6	0 29 58	0 31 58	0 34 3	0 36 13	0 38 28	0 40 50	0 43 18	0 45 50	0 48 29	0 51 12	0 54 1
5	0 22 40	0 24 14	0 25 56	0 27 38	0 29 27	0 31 24	0 33 26	0 35 33	0 37 44	0 40 3	0 42 28	0 44 56	0 47 31	0 50 10	0 52 54
6	0 22 20	0 23 52	0 25 31	0 27 11	0 28 57	0 30 51	0 32 51	0 34 55	0 37 2	0 39 18	0 41 40	0 44 5	0 46 36	0 49 11	0 51 50
7	0 22 1	0 23 31	0 25 7	0 26 45	0 28 29	0 30 20	0 32 17	0 34 18	0 36 22	0 38 35	0 40 54	0 43 16	0 45 43	0 48 14	0 50 49
8	0 21 43	0 23 11	0 24 44	0 26 20	0 28 2	0 29 50	0 31 44	0 33 42	0 35 44	0 37 54	0 40 10	0 42 29	0 44 52	0 47 19	0 49 50
9	0 21 26	0 22 52	0 24 22	0 25 56	0 27 36	0 29 21	0 31 12	0 33 7	0 35 7	0 37 15	0 39 28	0 41 44	0 44 3	0 46 26	0 48 53
10	0 21 10	0 22 33	0 24 1	0 25 33	0 27 11	0 28 53	0 30 41	0 32 33	0 34 31	0 36 38	0 38 48	0 41 1	0 43 16	0 45 35	0 47 58
11	0 20 54	0 22 15	0 23 41	0 25 11	0 26 47	0 28 26	0 30 12	0 32 0	0 33 56	0 36 2	0 38 9	0 40 19	0 42 31	0 44 46	0 47 5
12	0 20 38	0 21 57	0 23 21	0 24 50	0 26 24	0 28 0	0 29 44	0 31 29	0 33 23	0 35 26	0 37 31	0 39 38	0 41 47	0 43 59	0 46 14
13	0 20 23	0 21 40	0 23 2	0 24 29	0 26 1	0 27 35	0 29 17	0 31 0	0 32 52	0 34 51	0 36 53	0 38 58	0 41 4	0 43 14	0 45 25
14	0 20 8	0 21 23	0 22 44	0 24 9	0 25 39	0 27 11	0 28 51	0 30 32	0 32 22	0 34 17	0 36 16	0 38 18	0 40 22	0 42 30	0 44 38
15	0 19 53	0 21 6	0 22 26	0 23 49	0 25 17	0 26 48	0 28 26	0 30 5	0 31 52	0 33 44	0 35 50	0 37 39	0 39 41	0 41 47	0 43 53
16	0 19 38	0 20 49	0 22 8	0 23 30	0 24 56	0 26 25	0 28 1	0 29 39	0 31 23	0 33 12	0 35 15	0 37 1	0 39 1	0 41 5	0 43 9
17	0 19 23	0 20 33	0 21 51	0 23 11	0 24 35	0 26 3	0 27 37	0 29 13	0 30 54	0 32 41	0 34 41	0 36 24	0 38 22	0 40 23	0 42 26
18	0 19 9	0 20 18	0 21 34	0 22 52	0 24 15	0 25 40	0 27 13	0 28 47	0 30 26	0 32 10	0 34 7	0 35 48	0 37 44	0 39 42	0 41 44
19	0 18 55	0 20 3	0 21 17	0 22 33	0 23 55	0 25 19	0 26 49	0 28 21	0 29 58	0 31 39	0 33 34	0 35 13	0 37 6	0 39 2	0 41 3
20	0 18 41	0 19 48	0 20 59	0 22 14	0 23 34	0 24 57	0 26 25	0 27 55	0 29 30	0 31 8	0 32 51	0 34 38	0 36 29	0 38 23	0 40 22
21	0 18 27	0 19 33	0 20 42	0 21 56	0 23 14	0 24 35	0 26 1	0 27 30	0 29 3	0 30 40	0 32 21	0 34 6	0 35 54	0 37 46	0 39 43
22	0 18 13	0 19 18	0 20 26	0 21 38	0 22 55	0 24 14	0 25 38	0 27 6	0 28 37	0 30 13	0 31 52	0 33 34	0 35 20	0 37 10	0 39 5
23	0 18 0	0 19 3	0 20 10	0 21 21	0 22 36	0 23 54	0 25 16	0 26 42	0 29 12	0 29 46	0 31 23	0 33 3	0 34 47	0 36 35	0 38 27

LATITUDE 31° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 2 16	1 5 36	1 9 2	1 12 34	1 16 12	1 19 56	1 23 45	1 27 40	1 31 42	1 35 49	1 40 2	1 44 20	1 48 44	1 53 13	1 57 49
1	1 3 49	1 7 14	1 10 45	1 14 23	1 18 7	1 21 57	1 25 52	1 29 53	1 34 1	1 38 15	1 42 35	1 46 59	1 51 30	1 56 7	2 0 50
2	1 5 26	1 8 57	1 12 33	1 16 17	1 20 8	1 24 4	1 28 6	1 32 13	1 36 28	1 40 50	1 45 17	1 49 48	1 54 27	1 59 12	2 4 2
3	1 7 7	1 10 44	1 14 27	1 18 17	1 22 15	1 26 19	1 30 28	1 34 42	1 39 4	1 43 34	1 48 9	1 52 49	1 57 35	2 2 28	2 7 26
4	1 8 55	1 12 39	1 16 29	1 20 26	1 24 31	1 28 43	1 33 1	1 37 22	1 41 52	1 46 29	1 51 13	1 56 0	2 0 55	2 5 56	2 11 2
5	1 10 51	1 14 42	1 18 39	1 22 44	1 26 57	1 31 18	1 35 44	1 40 14	1 44 52	1 49 36	1 54 26	1 59 23	2 4 27	2 9 37	2 14 52
6	1 12 56	1 16 54	1 20 59	1 25 12	1 29 33	1 34 2	1 38 36	1 43 15	1 48 2	1 52 55	1 57 54	2 3 0	2 8 13	2 13 32	2 18 57
7	1 15 9	1 19 15	1 23 29	1 27 51	1 32 20	1 36 56	1 41 38	1 46 26	1 51 22	1 56 25	2 1 34	2 6 50	2 12 12	2 17 41	2 23 16
8	1 17 29	1 21 45	1 26 9	1 30 41	1 35 19	1 40 3	1 44 54	1 49 54	1 55 0	2 0 13	2 5 32	2 10 58	2 16 31	2 22 11	2 27 56
9	1 20 5	1 24 30	1 29 2	1 33 41	1 38 29	1 43 26	1 48 28	1 53 36	1 58 53	2 4 17	2 9 47	2 15 23	2 21 6	2 26 57	2 32 54
10	1 22 53	1 27 27	1 32 10	1 37 0	1 41 59	1 47 4	1 52 16	1 57 37	2 3 5	2 8 40	2 14 21	2 20 9	2 26 3	2 32 6	2 38 15
11	1 25 51	1 30 37	1 35 31	1 40 34	1 45 44	1 51 1	1 56 25	2 1 57	2 7 37	2 13 23	2 19 17	2 25 19	2 31 27	2 37 41	2 44 3
12	1 29 9	1 34 7	1 39 12	1 44 25	1 49 47	1 55 18	2 0 55	2 6 41	2 12 33	2 18 31	2 24 37	2 30 51	2 37 13	2 43 42	2 50 18
13	1 32 47	1 37 58	1 43 17	1 48 43	1 54 17	1 59 59	2 5 49	2 11 48	2 17 55	2 24 10	2 30 32	2 37 0	2 43 36	2 50 20	2 57 10
14	1 36 46	1 42 11	1 47 43	1 53 23	1 59 12	2 5 9	2 11 14	2 17 28	2 23 50	2 30 19	2 36 55	2 43 38	2 50 30	2 57 30	3 4 35
15	1 41 9	1 46 48	1 52 35	1 58 31	2 4 36	2 10 50	2 17 11	2 23 40	2 30 19	2 37 6	2 43 58	2 50 57	2 58 5	3 5 20	3 12 42
16	1 46 10	1 52 6	1 58 10	2 4 23	2 10 44	2 17 14	2 23 53	2 30 41	2 37 37	2 44 42	2 51 53	2 59 11	3 6 37	3 14 10	3 21 51
17	1 51 31	1 57 44	2 4 6	2 10 37	2 17 17	2 24 7	2 31 4	2 38 9	2 45 23	2 52 46	3 0 16	3 7 52	3 15 36	3 23 28	3 31 28
18	1 57 41	2 4 13	2 10 55	2 17 45	2 24 45	2 31 53	2 39 12	2 46 40	2 54 16	3 1 59	3 9 48	3 17 44	3 25 49	3 34 2	3 42 23
19	2 4 36	2 11 31	2 18 35	2 25 47	2 33 10	2 40 42	2 48 23	2 56 12	3 4 9	3 12 15	3 20 27	3 28 46	3 37 14	3 45 49	3 54 31
20	2 12 27	2 19 53	2 27 21	2 34 59	2 42 47	2 50 45	2 58 49	3 7 1	3 15 20	3 23 47	3 32 25	3 41 12	3 50 4	3 59 0	4 8 4
21	2 21 43	2 29 29	2 37 23	2 45 28	2 53 44	3 2 6	3 10 37	3 19 15	3 28 0	3 36 54	3 45 55	3 55 3	4 4 19	4 13 43	4 23 14
22	2 32 23	2 40 38	2 49 2	2 57 35	3 6 17	3 15 7	3 24 6	3 33 14	3 42 29	3 51 51	4 1 21	4 10 58	4 20 40	4 30 27	4 40 23
23	2 44 47	2 53 34	3 2 28	3 11 33	3 20 47	3 30 9	3 39 41	3 49 19	3 59 4	4 8 55	4 18 52	4 28 54	4 39 5	4 49 24	4 59 47

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 2 16	1 5 36	1 9 3	1 12 34	1 16 12	1 19 56	1 23 45	1 27 40	1 31 42	1 35 49	1 40 2	1 44 20	1 48 44	1 53 13	1 57 49
1	1 0 50	1 4 5	1 7 26	1 10 52	1 14 26	1 18 4	1 21 47	1 25 37	1 29 33	1 33 34	1 37 40	1 41 51	1 46 9	1 50 32	1 55 1
2	0 59 29	1 2 39	1 5 54	1 9 15	1 12 45	1 16 17	1 19 53	1 23 38	1 27 29	1 31 24	1 35 24	1 39 29	1 43 40	1 47 57	1 52 20
3	0 58 12	1 1 17	1 4 27	1 7 43	1 11 8	1 14 34	1 18 4	1 21 44	1 25 30	1 29 20	1 33 14	1 37 13	1 41 18	1 45 29	1 49 46
4	0 56 58	0 59 59	1 3 4	1 6 15	1 9 35	1 12 55	1 16 20	1 19 55	1 23 36	1 27 21	1 31 10	1 35 3	1 39 2	1 43 7	1 47 18
5	0 55 47	0 58 44	1 1 45	1 4 51	1 8 6	1 11 21	1 14 41	1 18 11	1 21 46	1 25 26	1 29 10	1 32 58	1 36 51	1 40 50	1 44 55
6	0 54 39	0 57 32	1 0 29	1 3 30	1 6 40	1 9 51	1 13 7	1 16 32	1 20 0	1 23 35	1 27 14	1 30 57	1 34 45	1 38 38	1 42 37
7	0 53 34	0 56 23	0 59 16	1 2 12	1 5 17	1 8 24	1 11 36	1 14 56	1 18 18	1 21 48	1 25 22	1 29 0	1 32 43	1 36 31	1 40 24
8	0 52 31	0 55 16	0 58 5	1 0 57	1 3 57	1 7 0	1 10 8	1 13 23	1 16 40	1 20 5	1 23 34	1 27 7	1 30 45	1 34 28	1 38 16
9	0 51 30	0 54 11	0 56 56	0 59 45	1 2 40	1 5 39	1 8 43	1 11 53	1 15 6	1 18 26	1 21 50	1 25 18	1 28 51	1 32 29	1 36 12
10	0 50 31	0 53 8	0 55 49	0 58 35	1 1 26	1 4 21	1 7 21	1 10 26	1 13 36	1 16 51	1 20 10	1 23 33	1 27 1	1 30 34	1 34 12
11	0 49 34	0 52 6	0 54 44	0 57 27	1 0 14	1 3 5	1 6 1	1 9 2	1 12 9	1 15 19	1 18 33	1 21 51	1 25 16	1 28 45	1 32 18
12	0 48 40	0 51 7	0 53 42	0 56 21	0 59 5	1 1 52	1 4 44	1 7 42	1 10 46	1 13 51	1 17 0	1 20 14	1 23 34	1 26 59	1 30 28
13	0 47 48	0 50 11	0 52 42	0 55 18	0 57 59	1 0 42	1 3 30	1 6 25	1 9 26	1 12 27	1 15 31	1 18 41	1 21 56	1 25 17	1 28 42
14	0 46 58	0 49 17	0 51 45	0 54 18	0 56 55	0 59 35	1 2 19	1 5 11	1 8 9	1 11 6	1 14 6	1 17 12	1 20 22	1 23 39	1 27 0
15	0 46 10	0 48 25	0 50 50	0 53 20	0 55 54	0 58 31	1 1 11	1 4 0	1 6 54	1 9 47	1 12 44	1 15 46	1 18 52	1 22 5	1 25 22
16	0 45 23	0 47 35	0 49 57	0 52 24	0 54 55	0 57 29	1 0 6	1 2 51	1 5 41	1 8 31	1 11 25	1 14 23	1 17 25	1 20 34	1 23 47
17	0 44 37	0 46 47	0 49 6	0 51 30	0 53 58	0 56 29	0 59 3	1 1 44	1 4 30	1 7 17	1 10 8	1 13 3	1 16 1	1 19 6	1 22 15
18	0 43 52	0 46 1	0 48 17	0 50 38	0 53 3	0 55 31	0 58 2	1 0 39	1 3 21	1 6 5	1 8 53	1 11 45	1 14 40	1 17 41	1 20 46
19	0 43 8	0 45 16	0 47 29	0 49 47	0 52 9	0 54 34	0 57 0	0 59 36	1 2 14	1 4 55	1 7 40	1 10 29	1 13 21	1 16 18	1 19 19
20	0 42 25	0 44 32	0 46 42	0 48 57	0 51 16	0 53 38	0 56 4	0 58 35	1 1 9	1 3 47	1 6 29	1 9 15	1 12 4	1 14 57	1 17 54
21	0 41 43	0 43 48	0 45 56	0 48 8	0 50 24	0 52 43	0 55 7	0 57 35	1 0 6	1 2 41	1 5 20	1 8 2	1 10 48	1 13 38	1 16 31
22	0 41 2	0 43 5	0 45 10	0 47 20	0 49 33	0 51 49	0 54 10	0 56 36	0 59 4	1 1 36	1 4 11	1 6 50	1 9 33	1 12 20	1 15 10
23	0 40 22	0 42 22	0 44 25	0 46 32	0 48 42	0 50 56	0 53 14	0 55 37	0 58 3	1 0 31	1 3 3	1 5 39	1 8 19	1 11 3	1 13 50

LATITUDE 31° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	2 2 29	2 7 15	2 12 7	2 17 4	2 22 7	2 27 15	2 32 27	2 37 45	2 43 8	2 48 37	2 54 11	2 59 49	3 5 33	3 11 22	3 17 15
1	2 5 38	2 10 31	2 15 30	2 20 35	2 25 46	2 31 2	2 36 22	2 41 49	2 47 21	2 52 58	2 58 40	3 4 26	3 10 18	3 16 16	3 22 20
2	2 8 58	2 13 59	2 19 6	2 24 19	2 29 38	2 35 2	2 40 31	2 46 6	2 51 47	2 57 33	3 3 23	3 9 18	3 15 18	3 21 26	3 27 41
3	2 12 30	2 17 39	2 22 54	2 28 16	2 33 44	2 39 16	2 44 54	2 50 38	2 56 28	3 2 22	3 8 21	3 14 25	3 20 35	3 26 53	3 33 20
4	2 16 14	2 21 32	2 26 57	2 32 27	2 38 4	2 43 45	2 49 32	2 55 26	3 1 25	3 7 28	3 13 35	3 19 49	3 26 9	3 32 36	3 39 11
5	2 20 12	2 25 40	2 31 15	2 36 54	2 42 39	2 48 30	2 54 27	3 0 30	3 6 38	3 12 51	3 19 8	3 25 31	3 32 1	3 38 37	3 45 20
6	2 24 26	2 30 4	2 35 49	2 41 38	2 47 32	2 53 33	2 59 40	3 5 53	3 12 11	3 18 35	3 25 3	3 31 37	3 38 17	3 45 2	3 51 53
7	2 28 58	2 34 46	2 40 41	2 46 41	2 52 45	2 58 56	3 5 14	3 11 36	3 18 5	3 24 40	3 31 21	3 38 8	3 44 59	3 51 54	3 58 54
8	2 33 46	2 39 45	2 45 51	2 52 2	2 58 19	3 4 42	3 11 10	3 17 45	3 24 26	3 31 12	3 38 2	3 44 59	3 52 3	3 59 11	4 6 22
9	2 38 57	2 35 7	2 51 25	2 57 48	3 4 17	3 10 51	3 17 30	3 24 17	3 31 11	3 38 9	3 45 11	3 52 20	3 59 37	4 6 57	4 14 19
10	2 44 31	2 50 54	2 57 23	3 3 58	3 10 40	3 17 27	3 24 19	3 31 17	3 38 22	3 45 33	3 52 51	4 0 12	4 7 37	4 15 11	4 22 53
11	2 50 32	2 57 7	3 3 49	3 10 37	3 17 31	3 24 31	3 31 37	3 38 49	3 46 8	3 53 33	4 1 5	4 8 40	4 16 17	4 24 4	4 32 2
12	2 57 1	3 3 50	3 10 46	3 17 48	3 24 57	3 32 11	3 39 32	3 46 58	3 54 31	4 2 9	4 9 53	4 17 43	4 25 39	4 33 42	4 41 52
13	3 4 5	3 11 8	3 18 19	3 25 36	3 33 0	3 40 30	3 48 5	3 55 46	4 3 32	4 11 26	4 19 27	4 27 31	4 35 38	4 43 55	4 52 22
14	3 11 45	3 19 4	3 26 30	3 34 3	3 41 45	3 49 31	3 57 22	4 5 19	4 13 22	4 21 30	4 29 44	4 38 6	4 46 35	4 55 7	5 3 44
15	3 20 11	3 27 47	3 35 29	3 43 19	3 51 17	3 59 20	4 7 27	4 15 40	4 24 0	4 32 27	4 41 0	4 49 37	4 58 19	5 7 6	5 15 58
16	3 29 39	3 37 33	3 45 34	3 53 43	4 1 59	4 10 19	4 18 42	4 27 13	4 35 53	4 44 38	4 53 27	5 2 20	5 11 18	5 20 25	5 29 41
17	3 39 35	3 47 48	3 56 7	4 4 34	4 13 8	4 21 47	4 30 30	4 39 21	4 48 19	4 57 21	5 6 28	5 15 39	5 24 55	5 34 17	5 43 44
18	3 50 51	3 59 24	4 8 2	4 16 49	4 25 43	4 34 42	4 43 45	4 52 55	5 2 12	5 11 33	5 20 58	5 30 29	5 40 7	5 49 49	5 59 34
19	4 3 19	4 12 13	4 21 14	4 30 23	4 39 39	4 48 59	4 58 23	5 7 52	5 17 25	5 27 5	5 36 51	5 46 42	5 56 37	6 6 37	6 16 41
20	4 17 17	4 36 34	4 35 56	4 45 27	4 55 6	5 4 47	5 14 32	5 24 23	5 34 19	5 44 22	5 54 30	6 4 40	6 14 53	6 25 13	6 35 40
21	4 32 51	4 42 33	4 52 21	5 2 15	5 12 15	5 22 19	5 32 27	5 42 41	5 53 0	6 3 23	6 13 50	6 24 12	6 34 59	6 45 38	6 56 19
22	4 50 26	5 0 32	5 10 43	5 21 1	5 31 25	5 41 53	5 52 25	6 3 1	6 13 40	6 24 25	6 35 15	6 46 11	6 57 7	7 8 3	7 19 0
23	5 10 14	5 20 46	5 31 24	5 42 7	5 52 56	6 3 46	6 14 39	6 25 37	6 36 41	6 47 48	6 58 58	7 10 13	7 21 30	7 32 47	7 44 5

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	2 2 29	2 7 15	2 12 7	2 17 4	2 22 7	2 27 15	2 32 27	2 37 45	2 43 8	2 48 37	2 54 11	2 59 49	3 5 33	3 11 22	3 17 15
1	1 59 35	2 4 15	2 9 0	2 13 50	2 18 46	2 23 48	2 28 47	2 33 57	2 39 11	2 44 33	2 50 1	2 55 30	3 1 7	3 6 48	3 12 33
2	1 56 48	2 1 22	2 6 1	2 10 44	2 15 33	2 20 28	2 25 15	2 30 17	2 35 24	2 40 39	2 46 0	2 51 21	2 56 51	3 2 24	3 8 1
3	1 54 8	1 58 36	2 3 9	2 7 45	2 12 27	2 17 15	2 21 51	2 26 46	2 31 46	2 36 54	2 42 8	2 47 22	2 52 45	2 58 10	3 3 40
4	1 51 34	1 55 56	2 0 23	2 4 52	2 9 27	2 14 8	2 18 35	2 23 24	2 28 17	2 33 18	2 38 25	2 43 32	2 48 48	2 54 6	2 59 29
5	1 49 5	1 53 21	1 57 42	2 2 5	2 6 33	2 11 7	2 15 27	2 20 10	2 24 57	2 29 51	2 34 51	2 39 51	2 45 0	2 50 11	2 55 27
6	1 46 41	1 50 51	1 55 6	1 59 23	2 3 45	2 8 12	2 12 27	2 17 4	2 21 45	2 26 32	2 31 25	2 36 19	2 41 21	2 46 25	2 51 34
7	1 44 22	1 48 26	1 52 35	1 56 46	2 1 2	2 5 23	2 9 35	2 14 6	2 18 41	2 23 21	2 28 7	2 32 55	2 37 50	2 42 48	2 47 50
8	1 42 8	1 46 6	1 50 9	1 54 15	1 58 25	2 2 40	2 6 50	2 11 15	2 15 44	2 20 18	2 24 57	2 29 39	2 34 27	2 39 19	2 44 15
9	1 39 59	1 43 51	1 47 48	1 51 49	1 55 54	2 0 3	2 4 12	2 8 31	2 12 54	2 17 22	2 21 55	2 26 31	2 31 12	2 35 58	2 40 48
10	1 37 54	1 41 41	1 45 32	1 49 28	1 53 28	1 57 32	2 1 41	2 5 54	2 10 11	2 14 33	2 19 0	2 23 30	2 28 5	2 32 45	2 37 29
11	1 35 56	1 39 38	1 43 22	1 47 13	1 51 8	1 55 7	1 59 14	2 3 22	2 7 33	2 11 50	2 16 12	2 20 36	2 25 6	2 29 40	2 34 19
12	1 34 2	1 37 39	1 41 18	1 45 4	1 48 54	1 52 48	1 56 52	2 0 55	2 5 1	2 9 13	2 13 30	2 17 48	2 22 13	2 26 41	2 31 15
13	1 32 12	1 35 45	1 39 20	1 43 1	1 46 46	1 50 35	1 54 35	1 58 33	2 2 34	2 6 41	2 10 53	2 15 5	2 19 25	2 23 48	2 28 17
14	1 30 26	1 33 55	1 37 26	1 41 2	1 44 43	1 48 27	1 52 23	1 56 16	2 0 12	2 4 14	2 8 21	2 12 28	2 16 43	2 21 1	2 25 25
15	1 28 44	1 32 9	1 35 36	1 39 8	1 42 45	1 46 25	1 50 15	1 54 3	1 57 54	2 1 51	2 5 53	2 9 56	2 14 6	2 18 19	2 22 38
16	1 27 5	1 30 26	1 33 49	1 37 17	1 40 50	1 44 26	1 48 10	1 51 53	1 55 40	1 59 32	2 3 29	2 7 28	2 11 33	2 15 41	2 19 55
17	1 25 29	1 28 46	1 32 5	1 35 29	1 38 58	1 42 30	1 46 8	1 49 47	1 53 30	1 57 17	2 1 9	2 5 4	2 9 4	2 13 7	2 17 16
18	1 23 56	1 27 9	1 30 24	1 33 44	1 37 9	1 40 37	1 44 9	1 47 44	1 51 23	1 55 6	1 58 53	2 2 44	2 6 39	2 10 37	2 14 41
19	1 22 25	1 25 34	1 28 46	1 32 2	1 35 23	1 38 47	1 42 14	1 45 45	1 49 20	1 52 59	1 56 41	2 0 28	2 4 18	2 8 11	2 12 10
20	1 20 56	1 24 1	1 27 10	1 30 22	1 33 39	1 36 59	1 40 22	1 43 49	1 47 20	1 50 55	1 54 33	1 58 15	2 2 0	2 5 49	2 9 43
21	1 19 29	1 22 31	1 25 36	1 28 44	1 31 57	1 35 13	1 38 33	1 41 56	1 45 23	1 48 54	1 52 28	1 56 6	1 59 47	2 3 31	2 7 19
22	1 18 4	1 21 3	1 24 4	1 27 9	1 30 18	1 33 30	1 36 46	1 40 6	1 43 29	1 46 56	1 50 26	1 54 0	1 57 37	2 1 16	2 4 59
23	1 16 41	1 19 36	1 22 34	1 25 36	1 28 41	1 31 49	1 35 1	1 38 17	1 41 36	1 44 59	1 48 25	1 51 55	1 55 28	1 59 4	2 2 42

LATITUDE 32° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 41	0 10 51	0 11 6	0 11 28	0 11 57	0 12 31	0 13 12	0 13 59	0 14 52	0 15 52	0 16 58	0 18 10	0 19 28	0 20 53	0 22 23
1	0 10 42	0 10 52	0 11 8	0 11 31	0 12 1	0 12 36	0 13 19	0 14 7	0 15 2	0 16 4	0 17 12	0 18 26	0 19 46	0 21 14	0 22 47
2	0 10 44	0 10 53	0 11 10	0 11 34	0 12 5	0 12 41	0 13 26	0 14 15	0 15 12	0 16 16	0 17 26	0 18 43	0 20 5	0 21 36	0 23 11
3	0 10 45	0 10 55	0 11 12	0 11 37	0 12 9	0 12 46	0 13 33	0 14 24	0 15 23	0 16 29	0 17 41	0 19 1	0 20 25	0 21 58	0 23 36
4	0 10 47	0 10 57	0 11 14	0 11 40	0 12 13	0 12 51	0 13 40	0 14 33	0 15 34	0 16 42	0 17 56	0 19 19	0 20 45	0 22 21	0 24 2
5	0 10 48	0 10 59	0 11 16	0 11 43	0 12 17	0 12 57	0 13 47	0 14 42	0 15 45	0 16 55	0 18 11	0 19 37	0 21 6	0 22 45	0 24 29
6	0 10 50	0 11 1	0 11 18	0 11 46	0 12 21	0 13 3	0 13 54	0 14 51	0 15 56	0 17 8	0 18 27	0 19 56	0 21 28	0 23 10	0 24 57
7	0 10 51	0 11 3	0 11 20	0 11 49	0 12 25	0 13 9	0 14 1	0 15 0	0 16 7	0 17 22	0 18 44	0 20 15	0 21 51	0 23 36	0 25 27
8	0 10 53	0 11 5	0 11 26	0 11 52	0 12 29	0 13 15	0 14 8	0 15 9	0 16 18	0 17 36	0 19 1	0 20 35	0 22 15	0 24 4	0 25 59
9	0 10 54	0 11 7	0 11 26	0 11 56	0 12 34	0 13 21	0 14 16	0 15 19	0 16 30	0 17 51	0 19 19	0 20 56	0 22 40	0 24 34	0 26 33
10	0 10 56	0 11 9	0 11 29	0 12 0	0 12 39	0 13 27	0 14 24	0 15 29	0 16 43	0 18 7	0 19 38	0 21 18	0 23 7	0 25 5	0 27 9
11	0 10 57	0 11 11	0 11 33	0 12 4	0 12 45	0 13 34	0 14 32	0 15 39	0 16 56	0 18 23	0 19 57	0 21 41	0 23 35	0 25 38	0 27 47
12	0 10 59	0 11 13	0 11 37	0 12 9	0 12 52	0 13 42	0 14 40	0 15 50	0 17 11	0 18 42	0 20 20	0 22 9	0 24 8	0 26 16	0 28 31
13	0 11 0	0 11 15	0 11 41	0 12 14	0 12 59	0 13 51	0 14 49	0 16 3	0 17 29	0 19 5	0 20 48	0 22 41	0 24 46	0 26 59	0 29 20
14	0 11 2	0 11 17	0 11 45	0 12 19	0 13 6	0 14 1	0 15 0	0 16 18	0 17 50	0 19 31	0 21 20	0 23 19	0 25 30	0 27 49	0 30 17
15	0 11 3	0 11 19	0 11 49	0 12 25	0 13 14	0 14 12	0 15 14	0 16 36	0 18 14	0 20 0	0 21 55	0 24 1	0 26 19	0 28 45	0 31 21
16	0 11 5	0 11 21	0 11 53	0 12 31	0 13 23	0 14 24	0 15 31	0 16 57	0 18 41	0 20 33	0 22 34	0 24 48	0 27 13	0 29 47	0 32 32
17	0 11 6	0 11 24	0 11 57	0 12 38	0 13 33	0 14 37	0 15 51	0 17 21	0 19 11	0 21 10	0 23 18	0 25 40	0 28 13	0 30 56	0 33 51
18	0 11 8	0 11 27	0 12 1	0 12 45	0 13 44	0 14 52	0 16 14	0 17 49	0 19 45	0 21 51	0 24 7	0 26 37	0 29 19	0 32 12	0 35 18
19	0 11 9	0 11 30	0 12 5	0 12 53	0 13 57	0 15 10	0 16 40	0 18 21	0 20 24	0 22 37	0 25 1	0 27 40	0 30 32	0 33 36	0 36 54
20	0 11 11	0 11 33	0 12 10	0 13 2	0 14 12	0 15 31	0 17 9	0 18 57	0 21 8	0 23 29	0 26 2	0 28 51	0 31 54	0 35 12	0 38 44
21	0 11 12	0 11 36	0 12 16	0 13 12	0 14 28	0 15 55	0 17 41	0 19 39	0 21 59	0 24 32	0 27 18	0 30 20	0 33 37	0 37 13	0 41 1
22	0 11 14	0 11 39	0 12 24	0 13 25	0 14 48	0 16 22	0 18 17	0 20 29	0 22 59	0 25 46	0 28 47	0 32 4	0 35 37	0 39 33	0 43 39
23	0 11 15	0 11 43	0 12 34	0 13 40	0 15 11	0 16 54	0 18 59	0 21 27	0 24 10	0 27 13	0 30 33	0 34 7	0 37 58	0 42 15	0 46 42

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 41	0 10 51	0 11 6	0 11 28	0 11 57	0 12 31	0 13 12	0 13 59	0 14 52	0 15 52	0 16 58	0 18 10	0 19 28	0 20 53	0 22 23
1	0 10 40	0 10 50	0 11 4	0 11 26	0 11 53	0 12 27	0 13 7	0 13 53	0 14 44	0 15 43	0 16 48	0 17 58	0 19 14	0 20 35	0 22 3
2	0 10 39	0 10 48	0 11 2	0 11 24	0 11 49	0 12 23	0 13 2	0 13 47	0 14 37	0 15 34	0 16 38	0 17 46	0 19 0	0 20 18	0 21 44
3	0 10 38	0 10 46	0 11 0	0 11 22	0 11 45	0 12 19	0 12 57	0 13 41	0 14 30	0 15 25	0 16 28	0 17 34	0 18 46	0 20 2	0 21 26
4	0 10 37	0 10 44	0 10 58	0 11 20	0 11 42	0 12 15	0 12 52	0 13 35	0 14 23	0 15 16	0 16 18	0 17 22	0 18 32	0 19 46	0 21 8
5	0 10 35	0 10 42	0 10 56	0 11 17	0 11 39	0 12 11	0 12 47	0 13 29	0 14 16	0 15 7	0 16 8	0 17 10	0 18 19	0 19 31	0 20 51
6	0 10 33	0 10 40	0 10 54	0 11 14	0 11 36	0 12 7	0 12 42	0 13 23	0 14 9	0 14 59	0 15 58	0 16 59	0 18 6	0 19 16	0 20 34
7	0 10 31	0 10 38	0 10 52	0 11 11	0 11 33	0 12 3	0 12 37	0 13 17	0 14 2	0 14 51	0 15 48	0 16 48	0 17 53	0 19 2	0 20 18
8	0 10 29	0 10 36	0 10 50	0 11 8	0 11 30	0 11 59	0 12 32	0 13 11	0 13 55	0 14 43	0 15 38	0 16 37	0 17 40	0 18 48	0 20 2
9	0 10 27	0 10 34	0 10 48	0 11 5	0 11 27	0 11 55	0 12 27	0 13 5	0 13 48	0 14 35	0 15 28	0 16 26	0 17 28	0 18 35	0 19 47
10	0 10 25	0 10 32	0 10 45	0 11 2	0 11 24	0 11 51	0 12 22	0 12 59	0 13 41	0 14 27	0 15 19	0 16 15	0 17 16	0 18 22	0 19 33
11	0 10 23	0 10 30	0 10 42	0 10 59	0 11 21	0 11 47	0 12 18	0 12 53	0 13 34	0 14 19	0 15 10	0 16 5	0 17 5	0 18 10	0 19 19
12	0 10 21	0 10 27	0 10 39	0 10 56	0 11 17	0 11 43	0 12 13	0 12 47	0 13 27	0 14 11	0 15 1	0 15 55	0 16 54	0 17 58	0 19 6
13	0 10 18	0 10 24	0 10 36	0 10 53	0 11 13	0 11 39	0 12 8	0 12 41	0 13 20	0 14 3	0 14 52	0 15 45	0 16 43	0 17 46	0 18 53
14	0 10 15	0 10 21	0 10 33	0 10 50	0 11 9	0 11 35	0 12 3	0 12 35	0 13 13	0 13 56	0 14 44	0 15 35	0 16 32	0 17 34	0 18 40
15	0 10 12	0 10 18	0 10 30	0 10 47	0 11 5	0 11 31	0 11 58	0 12 29	0 13 6	0 13 49	0 14 36	0 15 26	0 16 21	0 17 22	0 18 27
16	0 10 9	0 10 15	0 10 27	0 10 43	0 11 1	0 11 27	0 11 53	0 12 23	0 13 0	0 13 42	0 14 28	0 15 17	0 16 11	0 17 10	0 18 14
17	0 10 9	0 10 12	0 10 24	0 10 39	0 10 57	0 11 22	0 11 48	0 12 18	0 12 54	0 13 35	0 14 20	0 15 8	0 16 1	0 16 58	0 18 1
18	0 10 3	0 10 9	0 10 21	0 10 35	0 10 53	0 11 17	0 11 43	0 12 13	0 12 48	0 13 28	0 14 12	0 14 59	0 15 51	0 16 47	0 17 48
19	0 10 0	0 10 6	0 10 17	0 10 31	0 10 49	0 11 12	0 11 38	0 12 8	0 12 42	0 13 21	0 14 4	0 14 50	0 15 41	0 16 36	0 17 35
20	0 9 57	0 10 3	0 10 13	0 10 27	0 10 45	0 11 7	0 11 33	0 12 3	0 12 36	0 13 14	0 13 56	0 14 41	0 15 31	0 16 25	0 17 22
21	0 9 54	0 10 0	0 10 9	0 10 23	0 10 41	0 11 2	0 11 28	0 11 57	0 12 30	0 13 7	0 13 48	0 14 32	0 15 21	0 16 14	0 17 10
22	0 9 51	0 10 57	0 10 6	0 10 19	0 10 37	0 10 58	0 11 23	0 11 51	0 12 24	0 13 0	0 13 40	0 14 24	0 15 12	0 16 3	0 16 58
23	0 9 48	0 9 54	0 10 3	0 10 16	0 10 33	0 10 54	0 11 18	0 11 46	0 12 18	0 12 54	0 13 33	0 14 16	0 15 3	0 15 53	0 16 47

LATITUDE 32° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 24 0	0 25 43	0 27 32	0 29 27	0 31 28	0 33 35	0 35 49	0 38 9	0 40 34	0 43 5	0 45 43	0 48 26	0 51 15	0 54 11	0 57 12
1	0 24 27	0 26 14	0 28 5	0 30 4	0 32 9	0 34 19	0 36 37	0 39 1	0 41 30	0 44 5	0 46 47	0 49 35	0 52 29	0 55 30	0 58 28
2	0 24 54	0 26 45	0 28 40	0 30 43	0 32 50	0 35 4	0 37 26	0 39 54	0 42 27	0 45 7	0 47 53	0 50 46	0 53 45	0 56 51	0 59 48
3	0 25 22	0 27 17	0 29 16	0 31 23	0 33 32	0 35 50	0 38 16	0 40 48	0 43 26	0 46 11	0 49 2	0 52 0	0 55 4	0 58 15	1 1 13
4	0 25 51	0 27 50	0 29 53	0 32 4	0 34 15	0 36 38	0 39 8	0 41 44	0 44 27	0 47 17	0 50 14	0 53 17	0 56 27	0 59 44	1 2 59
5	0 26 21	0 28 24	0 30 32	0 32 47	0 34 59	0 37 28	0 40 3	0 42 44	0 45 32	0 48 27	0 51 29	0 54 38	0 57 54	1 1 17	1 4 46
6	0 26 53	0 29 0	0 31 13	0 33 32	0 35 45	0 38 21	0 41 1	0 43 48	0 46 42	0 49 43	0 52 51	0 56 6	0 59 29	1 2 59	1 6 33
7	0 27 27	0 29 38	0 31 56	0 34 19	0 36 36	0 39 17	0 42 3	0 44 56	0 47 56	0 51 3	0 54 18	0 57 40	1 1 10	1 4 47	1 8 25
8	0 28 3	0 30 18	0 32 41	0 35 8	0 37 32	0 40 18	0 43 10	0 46 9	0 49 15	0 52 28	0 55 50	0 59 19	1 2 56	1 6 40	1 10 25
9	0 28 41	0 31 0	0 33 28	0 36 0	0 38 34	0 41 25	0 44 23	0 47 28	0 50 41	0 54 0	0 57 29	1 1 5	1 4 50	1 8 41	1 12 35
10	0 29 22	0 31 45	0 34 18	0 36 56	0 39 42	0 42 38	0 45 42	0 48 54	0 52 14	0 55 40	0 59 16	1 2 59	1 6 52	1 10 50	1 14 55
11	0 30 5	0 32 33	0 35 11	0 37 54	0 40 54	0 43 57	0 47 9	0 50 30	0 53 59	0 57 35	1 1 20	1 5 13	1 9 16	1 13 24	1 17 29
12	0 30 54	0 33 27	0 36 11	0 39 0	0 42 12	0 45 24	0 48 44	0 52 14	0 55 52	0 59 38	1 3 32	1 7 35	1 11 48	1 16 7	1 20 13
13	0 31 49	0 34 28	0 37 19	0 40 15	0 43 38	0 46 59	0 50 28	0 54 7	0 57 54	1 1 50	1 5 53	1 10 6	1 14 29	1 18 59	1 23 20
14	0 32 53	0 35 39	0 38 38	0 41 42	0 45 13	0 48 43	0 52 21	0 56 9	1 0 5	1 4 11	1 8 24	1 12 47	1 17 20	1 22 1	1 26 38
15	0 34 5	0 36 59	0 40 8	0 43 20	0 46 58	0 50 37	0 54 24	0 58 22	1 2 28	1 6 44	1 11 8	1 15 42	1 20 26	1 25 18	1 30 20
16	0 35 25	0 38 28	0 41 47	0 45 9	0 48 54	0 52 46	0 56 47	1 0 57	1 5 12	1 9 39	1 14 17	1 19 6	1 24 5	1 29 12	1 34 24
17	0 36 53	0 40 6	0 43 37	0 47 10	0 51 6	0 55 11	0 59 26	1 3 48	1 8 16	1 12 56	1 17 48	1 22 52	1 28 6	1 33 29	1 38 54
18	0 38 31	0 41 55	0 45 40	0 49 26	0 53 33	0 57 52	1 2 22	1 6 57	1 11 42	1 16 37	1 21 43	1 27 2	1 32 32	1 38 11	1 44 0
19	0 40 20	0 43 57	0 47 58	0 51 59	0 56 21	1 0 54	1 5 38	1 10 32	1 15 34	1 20 52	1 26 18	1 31 56	1 37 46	1 43 42	1 49 42
20	0 42 26	0 46 23	0 50 37	0 54 57	0 59 34	1 4 22	1 9 21	1 14 34	1 19 53	1 25 31	1 31 17	1 37 15	1 43 25	1 49 39	1 56 9
21	0 45 0	0 49 14	0 53 46	0 58 28	1 3 19	1 8 27	1 13 47	1 19 20	1 25 6	1 31 4	1 37 14	1 43 34	1 50 5	1 56 46	2 3 38
22	0 47 58	0 52 32	0 57 24	1 2 30	1 7 42	1 13 12	1 18 54	1 24 52	1 31 5	1 37 27	1 44 0	1 50 46	1 57 44	2 4 52	2 12 10
23	0 51 25	0 56 22	1 1 38	1 7 11	1 12 50	1 18 48	1 25 0	1 31 33	1 38 8	1 44 58	1 52 1	1 59 16	2 6 44	2 14 19	2 22 8

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 24 0	0 25 43	0 27 32	0 29 27	0 31 28	0 33 35	0 35 49	0 38 9	0 40 34	0 43 5	0 45 43	0 48 26	0 51 15	0 54 11	0 57 12
1	0 23 38	0 25 18	0 27 5	0 28 55	0 30 52	0 32 56	0 35 5	0 37 21	0 39 43	0 42 10	0 44 44	0 47 22	0 50 7	0 52 58	0 55 55
2	0 23 17	0 24 54	0 26 38	0 28 25	0 30 19	0 32 20	0 34 24	0 36 36	0 38 55	0 41 18	0 43 48	0 46 21	0 49 2	0 51 49	0 54 42
3	0 22 56	0 24 31	0 26 12	0 27 57	0 29 48	0 31 46	0 33 46	0 35 54	0 38 2	0 40 28	0 42 54	0 45 24	0 48 1	0 50 44	0 53 32
4	0 22 36	0 24 9	0 25 47	0 27 30	0 29 19	0 31 14	0 33 11	0 35 15	0 37 26	0 39 41	0 42 3	0 44 30	0 47 3	0 49 42	0 52 26
5	0 22 17	0 23 48	0 25 23	0 27 4	0 28 51	0 30 43	0 32 30	0 34 38	0 36 45	0 38 57	0 41 15	0 43 39	0 46 8	0 48 43	0 51 23
6	0 21 58	0 23 27	0 25 0	0 26 39	0 28 24	0 30 13	0 32 6	0 34 3	0 36 6	0 38 15	0 40 30	0 42 51	0 45 16	0 47 47	0 50 23
7	0 21 40	0 23 7	0 24 38	0 26 15	0 27 57	0 29 44	0 31 35	0 33 30	0 35 29	0 37 35	0 39 47	0 42 5	0 44 27	0 46 54	0 49 26
8	0 21 22	0 22 47	0 24 16	0 25 51	0 27 31	0 29 16	0 31 5	0 32 58	0 34 54	0 36 57	0 39 6	0 41 21	0 43 40	0 46 4	0 48 32
9	0 21 5	0 22 28	0 23 55	0 25 28	0 27 6	0 28 49	0 30 35	0 32 26	0 34 21	0 36 21	0 38 27	0 40 39	0 42 55	0 45 16	0 47 41
10	0 20 49	0 22 10	0 23 36	0 25 6	0 26 42	0 28 22	0 30 6	0 31 55	0 33 49	0 35 47	0 37 50	0 39 59	0 42 12	0 44 30	0 46 52
11	0 20 33	0 21 52	0 23 16	0 24 44	0 26 18	0 27 56	0 29 38	0 31 25	0 33 17	0 35 13	0 37 13	0 39 19	0 41 29	0 43 45	0 46 4
12	0 20 18	0 21 35	0 22 57	0 24 23	0 25 55	0 27 31	0 29 11	0 30 56	0 32 46	0 34 40	0 36 37	0 38 40	0 40 47	0 43 1	0 45 17
13	0 20 3	0 21 18	0 22 38	0 24 2	0 25 32	0 27 7	0 28 45	0 30 28	0 32 16	0 34 7	0 36 2	0 38 2	0 40 6	0 42 18	0 44 31
14	0 19 48	0 21 1	0 22 19	0 23 41	0 25 10	0 26 43	0 28 20	0 30 1	0 31 46	0 33 35	0 35 28	0 37 25	0 39 26	0 41 35	0 43 45
15	0 19 34	0 20 45	0 22 1	0 23 21	0 24 48	0 26 20	0 27 55	0 29 34	0 31 17	0 33 4	0 34 54	0 36 49	0 38 47	0 40 53	0 43 0
16	0 19 20	0 20 29	0 21 44	0 23 2	0 24 27	0 25 57	0 27 30	0 29 7	0 30 48	0 32 33	0 34 21	0 36 13	0 38 9	0 40 12	0 42 16
17	0 19 6	0 20 14	0 21 27	0 22 44	0 24 7	0 25 35	0 27 6	0 28 41	0 30 19	0 32 2	0 33 48	0 35 38	0 37 32	0 39 32	0 41 33
18	0 18 52	0 19 59	0 21 11	0 22 26	0 23 47	0 25 13	0 26 42	0 28 15	0 29 51	0 31 32	0 33 16	0 35 4	0 36 56	0 38 53	0 40 52
19	0 18 38	0 19 44	0 20 55	0 22 9	0 23 28	0 24 52	0 26 19	0 27 50	0 29 24	0 31 3	0 32 45	0 34 31	0 36 21	0 38 15	0 40 12
20	0 18 24	0 19 29	0 20 39	0 21 52	0 23 9	0 24 31	0 25 56	0 27 25	0 28 57	0 30 34	0 32 14	0 33 58	0 35 46	0 37 38	0 39 33
21	0 18 11	0 19 15	0 20 23	0 21 35	0 22 50	0 24 10	0 25 34	0 27 1	0 28 32	0 30 7	0 31 45	0 33 27	0 35 13	0 37 3	0 38 56
22	0 17 58	0 19 1	0 20 7	0 21 18	0 22 32	0 23 50	0 25 12	0 26 38	0 28 7	0 29 41	0 31 17	0 32 57	0 34 41	0 36 29	0 38 20
23	0 17 45	0 18 47	0 19 52	0 21 1	0 22 14	0 23 31	0 24 51	0 26 15	0 27 43	0 29 15	0 30 50	0 32 28	0 34 9	0 35 55	0 37 44

LATITUDE 32° NORTH OR SOUTH.

Declination same name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 0 19	1 3 31	1 6 50	1 10 14	1 13 44	1 17 20	1 21 1	1 24 49	1 28 41	1 32 40	1 36 44	1 40 53	1 45 7	1 49 27	1 53 53
1	1 1 42	1 5 1	1 8 26	1 11 56	1 15 31	1 19 12	1 23 1	1 26 55	1 30 53	1 34 58	1 39 8	1 43 24	1 47 45	1 52 12	1 56 45
2	1 3 10	1 6 36	1 10 7	1 13 43	1 17 24	1 21 11	1 25 6	1 29 6	1 33 11	1 37 22	1 41 39	1 46 1	1 50 29	1 55 4	1 59 44
3	1 4 43	1 8 17	1 11 54	1 15 36	1 19 23	1 23 16	1 27 17	1 31 23	1 35 35	1 39 52	1 44 16	1 48 45	1 53 21	1 58 3	2 2 50
4	1 6 32	1 10 10	1 13 49	1 17 38	1 21 32	1 25 33	1 29 44	1 33 57	1 38 16	1 42 41	1 47 13	1 51 51	1 56 34	2 1 24	2 6 19
5	1 8 22	1 12 4	1 15 53	1 19 49	1 23 51	1 28 0	1 32 14	1 36 34	1 41 1	1 45 35	1 50 15	1 55 2	1 59 53	2 4 51	2 9 55
6	1 10 15	1 14 3	1 17 58	1 22 1	1 26 10	1 30 27	1 34 47	1 39 15	1 43 52	1 48 35	1 53 23	1 58 18	2 3 18	2 8 25	2 13 37
7	1 12 13	1 16 9	1 20 11	1 24 31	1 28 38	1 33 3	1 37 32	1 42 9	1 46 54	1 51 46	1 56 42	2 1 45	2 6 54	2 12 10	2 17 31
8	1 14 20	1 18 24	1 22 35	1 26 52	1 31 17	1 35 50	1 40 30	1 45 16	1 50 9	1 55 9	2 0 14	2 5 25	2 10 43	2 16 8	2 21 38
9	1 16 40	1 20 51	1 25 11	1 29 37	1 34 11	1 38 52	1 43 42	1 48 38	1 53 40	1 58 49	2 4 4	2 9 25	2 14 54	2 20 30	2 26 11
10	1 19 10	1 23 32	1 28 1	1 32 37	1 37 20	1 42 11	1 47 10	1 52 16	1 57 28	2 2 47	2 8 13	2 13 45	2 19 25	2 25 12	2 31 4
11	1 22 54	1 26 26	1 31 4	1 35 49	1 40 44	1 45 47	1 50 57	1 56 12	2 1 35	2 7 5	2 12 42	2 18 26	2 24 17	2 30 15	2 36 19
12	1 24 50	1 29 34	1 34 24	1 39 21	1 44 28	1 49 42	1 54 2	2 0 28	2 6 4	2 11 46	2 16 36	2 23 32	2 29 35	2 35 45	2 42 2
13	1 28 6	1 33 0	1 38 1	1 43 10	1 48 28	1 53 53	1 59 26	2 5 6	2 10 53	2 16 46	2 22 49	2 29 0	2 35 16	2 41 36	2 48 7
14	1 31 36	1 36 42	1 41 57	1 47 20	1 52 51	1 58 29	2 4 14	2 10 8	2 16 8	2 22 14	2 28 31	2 34 57	2 41 28	2 48 5	2 54 49
15	1 35 31	1 40 50	1 45 18	1 51 55	1 57 39	2 3 31	2 9 31	2 15 38	2 21 56	2 28 22	2 34 53	2 41 29	2 48 14	2 55 8	3 2 7
16	1 39 50	1 45 24	1 51 6	1 56 56	2 2 55	2 9 3	2 15 19	2 21 44	2 28 17	2 34 58	2 41 45	2 48 40	2 55 41	3 2 50	3 10 6
17	1 44 36	1 50 27	1 56 27	2 2 33	2 8 49	2 15 13	2 21 46	2 28 28	2 35 18	2 42 16	2 49 21	2 56 32	3 3 52	3 11 19	3 18 52
18	1 49 59	1 56 6	2 2 23	2 8 49	2 15 24	2 22 7	2 28 58	2 35 57	2 43 5	2 50 21	2 57 45	3 5 18	3 12 56	3 20 39	3 28 31
19	1 56 2	2 2 31	2 9 5	2 15 47	2 22 42	2 29 45	2 36 58	2 44 19	2 51 48	2 59 24	3 7 7	3 14 57	3 22 56	3 31 3	3 39 17
20	2 2 49	2 9 37	2 16 34	2 23 39	2 30 56	2 38 24	2 45 58	2 53 39	3 1 28	3 9 25	3 17 30	3 25 43	3 34 3	3 42 32	3 51 11
21	2 10 39	2 17 51	2 25 12	2 32 44	2 40 24	2 48 14	2 56 12	3 4 18	3 12 32	3 20 52	3 29 21	3 37 58	3 46 43	3 55 36	4 4 34
22	2 19 40	2 27 19	2 35 6	2 43 2	2 51 8	2 59 23	3 7 47	3 16 20	3 24 59	3 33 46	3 42 40	3 51 42	4 0 51	4 10 8	4 19 30
23	2 30 5	2 38 13	2 46 30	2 54 58	3 3 33	3 12 16	3 21 7	3 30 7	3 39 13	3 48 28	3 57 49	4 7 19	4 16 54	4 26 35	4 36 13

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 0 19	1 3 31	1 6 50	1 10 14	1 13 44	1 17 20	1 21 1	1 24 49	1 28 41	1 32 40	1 36 44	1 40 53	1 45 7	1 49 27	1 53 53
1	0 58 58	1 2 6	1 5 23	1 8 43	1 12 6	1 15 37	1 19 14	1 22 56	1 26 43	1 30 35	1 34 32	1 38 36	1 42 44	1 47 0	1 51 19
2	0 57 41	1 0 45	1 3 59	1 7 14	1 10 32	1 13 57	1 17 30	1 21 7	1 24 49	1 28 35	1 32 25	1 36 24	1 40 26	1 44 38	1 48 50
3	0 56 27	0 59 27	1 2 38	1 5 48	1 9 2	1 12 21	1 15 50	1 19 22	1 22 59	1 26 39	1 30 23	1 34 16	1 38 13	1 42 21	1 46 27
4	0 55 17	0 58 13	1 1 20	1 4 25	1 7 35	1 10 49	1 14 14	1 17 41	1 21 13	1 24 47	1 28 25	1 32 13	1 36 5	1 40 8	1 44 9
5	0 54 10	0 57 2	1 0 4	1 3 5	1 6 11	1 9 21	1 12 41	1 15 3	1 19 30	1 22 59	1 26 32	1 30 15	1 34 2	1 37 59	1 41 55
6	0 53 6	0 55 54	0 58 51	1 1 48	1 4 50	1 7 56	1 11 11	1 14 28	1 17 50	1 21 14	1 24 43	1 28 21	1 32 3	1 35 54	1 39 45
7	0 52 5	0 54 49	0 57 41	1 0 34	1 3 32	1 6 34	1 9 44	1 12 56	1 16 13	1 19 33	1 22 58	1 26 31	1 30 8	1 33 53	1 37 39
8	0 51 7	0 53 47	0 56 34	0 59 23	1 2 17	1 5 15	1 8 20	1 11 28	1 14 40	1 17 56	1 21 17	1 24 45	1 28 17	1 31 56	1 35 37
9	0 50 12	0 52 48	0 55 30	0 58 15	1 1 5	1 3 59	1 6 59	1 10 3	1 13 11	1 16 23	1 19 40	1 23 3	1 26 30	1 30 3	1 33 39
10	0 49 20	0 51 52	0 54 28	0 57 9	0 59 55	1 2 45	1 5 41	1 8 41	1 11 45	1 14 53	1 18 6	1 21 25	1 24 47	1 28 14	1 31 45
11	0 48 29	0 50 58	0 53 27	0 56 5	0 58 47	1 1 34	1 4 26	1 7 22	1 10 22	1 13 27	1 16 36	1 19 51	1 23 8	1 26 29	1 29 35
12	0 47 39	0 50 5	0 52 28	0 55 3	0 57 42	1 0 26	1 3 14	1 6 6	1 9 2	1 12 4	1 15 9	1 18 20	1 21 32	1 24 48	1 28 10
13	0 46 50	0 49 13	0 51 31	0 54 3	0 56 39	0 59 20	1 2 4	1 4 53	1 7 45	1 10 44	1 13 45	1 16 52	1 20 0	1 23 11	1 26 29
14	0 46 2	0 48 22	0 50 36	0 53 5	0 55 38	0 58 16	1 0 57	1 3 43	1 6 31	1 9 26	1 12 23	1 15 27	1 18 31	1 21 38	1 24 52
15	0 45 14	0 47 32	0 49 43	0 52 9	0 54 39	0 57 14	0 59 52	1 2 35	1 5 20	1 8 11	1 11 4	1 13 5	1 17 5	1 20 9	1 23 19
16	0 44 27	0 46 42	0 48 52	0 51 15	0 53 42	0 56 14	0 58 49	1 1 29	1 4 11	1 6 58	1 9 48	1 12 45	1 15 42	1 18 43	1 21 49
17	0 43 41	0 45 53	0 48 3	0 50 23	0 52 47	0 55 16	0 57 48	1 0 25	1 3 4	1 5 47	1 8 34	1 11 27	1 14 21	1 17 19	1 20 22
18	0 42 57	0 45 6	0 47 16	0 49 33	0 51 54	0 54 20	0 56 49	0 59 22	1 1 58	1 4 38	1 7 22	1 10 11	1 13 2	1 15 57	1 18 57
19	0 42 15	0 44 21	0 46 30	0 48 44	0 51 2	0 53 25	0 55 51	0 58 21	1 0 54	1 3 31	1 6 12	1 8 57	1 11 45	1 14 37	1 17 34
20	0 41 34	0 43 37	0 45 45	0 47 56	0 50 11	0 52 31	0 54 54	0 57 21	0 59 51	1 2 25	1 5 3	1 7 45	1 10 30	1 13 19	1 16 13
21	0 40 54	0 42 55	0 45 1	0 47 9	0 49 22	0 51 39	0 53 59	0 56 23	0 58 50	1 1 21	1 3 56	1 6 35	1 9 17	1 12 3	1 14 54
22	0 40 15	0 42 14	0 44 17	0 46 23	0 48 33	0 50 48	0 53 5	0 55 26	0 57 51	1 0 19	1 2 51	1 5 27	1 8 6	1 10 49	1 13 36
23	0 39 37	0 41 34	0 43 34	0 45 38	0 47 45	0 49 57	0 52 12	0 54 30	0 56 52	0 59 18	1 1 47	1 4 20	1 6 57	1 9 37	1 12 29

LATITUDE 32° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 58 23	2 3 0	2 7 42	2 12 28	2 17 20	2 22 18	2 27 20	2 32 27	2 37 39	2 42 57	2 48 20	2 53 47	2 59 19	3 4 56	3 10 39
1	2 1 22	2 6 6	2 10 54	2 15 48	2 20 48	2 25 53	2 31 2	2 36 17	2 41 37	2 47 3	2 52 34	2 58 9	3 3 48	3 9 33	3 15 24
2	2 4 28	2 9 19	2 14 14	2 19 16	2 24 24	2 29 36	2 34 53	2 40 16	2 45 45	2 51 19	2 56 58	3 2 41	3 8 28	3 14 22	3 20 21
3	2 7 42	2 12 40	2 17 42	2 22 52	2 28 9	2 33 29	2 38 54	2 44 25	2 50 3	2 55 45	3 1 32	3 7 23	3 13 18	3 19 21	3 25 30
4	2 11 20	2 16 26	2 21 37	2 26 55	2 32 20	2 37 49	2 43 23	2 49 3	2 54 50	3 0 41	3 6 36	3 12 36	3 18 42	3 24 53	3 31 11
5	2 15 5	2 20 20	2 25 41	2 31 8	2 36 42	2 42 20	2 48 4	2 53 53	2 59 49	3 5 49	3 11 53	3 18 3	3 24 20	3 30 41	3 37 6
6	2 18 56	2 24 20	2 29 50	2 35 27	2 41 10	2 46 57	2 52 50	2 58 49	3 4 54	3 11 4	3 17 18	3 23 38	3 30 5	3 36 36	3 43 12
7	2 22 58	2 28 32	2 34 12	2 39 58	2 45 51	2 51 48	2 57 50	3 3 59	3 10 14	3 16 34	3 22 59	3 29 29	3 36 6	3 42 47	3 49 34
8	2 27 14	2 32 58	2 38 48	2 44 44	2 50 47	2 56 54	3 3 6	3 9 25	3 15 50	3 22 20	3 28 56	3 35 38	3 42 25	3 49 17	3 56 15
9	2 31 58	2 37 53	2 43 54	2 50 1	2 56 14	3 2 32	3 8 56	3 15 26	3 22 1	3 28 43	3 35 31	3 42 24	3 49 20	3 56 24	4 3 35
10	2 37 2	2 43 8	2 49 20	2 55 38	3 2 2	3 8 32	3 15 8	3 21 49	3 28 38	3 35 29	3 42 30	3 49 34	3 56 40	4 3 57	4 11 21
11	2 42 30	2 48 47	2 55 10	3 1 41	3 8 19	3 15 0	3 21 47	3 28 41	3 35 42	3 42 49	3 50 2	3 57 19	4 4 40	4 11 6	4 19 37
12	2 48 25	2 54 55	3 1 31	3 8 15	3 15 6	3 22 0	3 28 59	3 36 8	3 43 24	3 50 44	3 58 9	4 5 39	4 13 14	4 20 55	4 28 41
13	2 54 47	3 1 32	3 8 21	3 15 18	3 22 22	3 29 29	3 36 45	3 44 7	3 51 34	3 59 7	4 6 45	4 14 28	4 22 15	4 30 10	4 38 11
14	3 1 42	3 8 39	3 15 42	3 22 54	3 30 15	3 37 39	3 45 8	3 52 44	4 0 26	4 8 13	4 16 5	4 24 3	4 32 6	4 50 15	4 48 29
15	3 9 15	3 16 28	3 23 46	3 31 13	3 38 49	3 45 29	3 54 14	4 2 5	4 10 2	4 18 5	4 26 13	4 34 28	4 42 51	4 51 17	4 59 46
16	3 17 30	3 25 0	3 32 36	3 40 20	3 48 13	3 56 7	4 4 5	4 12 13	4 20 30	4 28 51	4 37 16	4 45 46	4 54 23	5 3 3	5 11 48
17	3 26 32	3 34 20	3 42 15	3 50 17	3 58 25	4 6 38	4 14 55	4 23 20	4 31 54	4 40 32	4 49 14	4 58 2	5 6 56	5 15 54	5 24 57
18	3 36 31	3 44 38	3 52 51	4 1 11	4 9 39	4 18 11	4 26 47	4 35 31	4 44 22	4 53 18	5 2 19	5 11 22	5 20 27	5 29 41	5 39 5
19	3 47 37	3 56 2	4 4 33	4 13 13	4 22 2	4 30 54	4 39 49	4 48 51	4 57 59	5 7 12	5 16 32	5 25 57	5 35 27	5 45 1	5 54 40
20	3 59 55	4 8 40	4 17 28	4 26 28	4 35 37	4 44 50	4 54 7	5 3 28	5 12 54	5 22 28	5 32 11	5 41 56	5 51 44	6 1 34	6 11 28
21	4 13 35	4 22 44	4 32 1	4 41 25	4 50 56	5 0 30	5 10 9	5 19 53	5 29 41	5 39 35	5 49 36	5 59 40	6 9 47	6 19 59	6 30 17
22	4 28 58	4 38 30	4 48 12	4 57 58	5 7 52	5 17 48	5 27 47	5 37 52	5 48 4	5 58 20	6 8 41	6 19 6	6 29 35	6 40 6	6 50 39
23	4 46 16	4 56 15	5 6 20	5 16 30	5 26 45	5 37 5	5 47 30	5 57 59	6 8 32	6 19 8	6 29 47	6 40 35	6 51 25	7 2 16	7 13 7

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 58 23	2 3 0	2 7 42	2 12 28	2 17 20	2 22 18	2 27 20	2 32 27	2 37 39	2 42 57	2 48 20	2 53 47	2 59 19	3 4 56	3 10 39
1	1 55 42	2 0 13	2 4 50	2 9 31	2 14 15	2 19 7	2 24 3	2 29 3	2 34 8	2 39 9	2 44 25	2 49 45	2 55 8	3 0 38	3 6 13
2	1 53 7	1 57 32	2 2 3	2 6 39	2 11 16	2 16 2	2 20 52	2 25 46	2 30 44	2 35 30	2 40 39	2 45 52	2 51 7	2 56 30	3 1 57
3	1 50 37	1 54 56	1 59 21	2 3 51	2 8 22	2 13 2	2 17 46	2 22 34	2 27 26	2 31 59	2 37 1	2 42 7	2 47 16	2 52 32	2 57 52
4	1 48 12	1 52 25	1 56 44	2 1 8	2 5 33	2 10 7	2 14 45	2 19 27	2 24 13	2 28 37	2 33 32	2 38 31	2 43 34	2 48 43	2 53 57
5	1 45 52	1 49 59	1 54 12	1 58 30	2 2 49	2 7 17	2 11 49	2 16 25	2 21 5	2 25 23	2 30 12	2 35 4	2 40 1	2 45 4	2 50 12
6	1 43 37	1 47 38	1 51 45	1 55 57	2 0 11	2 4 33	2 8 59	2 13 29	2 18 3	2 22 17	2 27 0	2 31 46	2 36 37	2 41 34	2 46 36
7	1 41 27	1 45 22	1 49 23	1 53 29	1 57 38	2 1 54	2 6 14	2 10 38	2 15 6	2 19 18	2 23 55	2 28 35	2 33 20	2 38 11	2 43 7
8	1 39 21	1 43 11	1 47 6	1 51 6	1 55 10	1 59 20	2 3 34	2 7 52	2 12 14	2 16 26	2 20 57	2 25 31	2 30 10	2 34 55	2 39 45
9	1 37 19	1 41 4	1 44 54	1 48 48	1 52 47	1 56 51	2 0 59	2 5 11	2 9 27	2 13 40	2 18 5	2 22 33	2 27 6	2 31 45	2 36 29
10	1 35 21	1 39 1	1 42 46	1 46 35	1 50 29	1 54 27	1 58 29	2 2 35	2 6 45	2 11 0	2 15 19	2 19 41	2 24 8	2 28 41	2 33 19
11	1 33 27	1 37 3	1 40 43	1 44 27	1 48 16	1 52 8	1 56 5	2 0 6	2 4 11	2 8 25	2 12 39	2 16 54	2 21 16	2 25 44	2 30 17
12	1 31 38	1 35 10	1 38 44	1 42 24	1 46 8	1 49 55	1 53 47	1 57 43	2 1 44	2 5 55	2 10 4	2 14 13	2 18 30	2 22 53	2 27 21
13	1 29 54	1 33 22	1 36 50	1 40 26	1 44 5	1 47 48	1 51 35	1 55 26	1 59 23	2 3 29	2 7 33	2 11 38	2 15 50	2 20 8	2 24 30
14	1 28 14	1 31 38	1 35 1	1 38 33	1 42 7	1 45 46	1 49 29	1 53 15	1 57 7	2 1 8	2 5 7	2 9 8	2 13 15	2 17 28	2 21 44
15	1 26 37	1 29 57	1 33 16	1 36 44	1 40 13	1 43 48	1 47 27	1 51 9	1 54 56	1 58 51	2 2 45	2 6 42	2 10 44	2 14 52	2 19 3
16	1 25 3	1 28 19	1 31 34	1 34 58	1 38 23	1 41 54	1 45 29	1 49 7	1 52 49	1 56 38	2 0 28	2 4 21	2 8 19	2 12 21	2 16 27
17	1 23 32	1 26 44	1 29 55	1 33 15	1 36 36	1 40 3	1 43 34	1 47 8	1 50 46	1 54 29	1 58 15	2 2 4	2 5 58	2 9 55	2 13 56
18	1 22 3	1 25 11	1 28 19	1 31 35	1 34 52	1 38 15	1 41 42	1 45 12	1 48 46	1 52 24	1 56 6	1 59 51	2 3 41	2 7 33	2 11 29
19	1 20 36	1 23 40	1 26 45	1 29 57	1 33 11	1 36 30	1 39 53	1 43 19	1 46 49	1 50 23	1 54 1	1 57 42	2 1 28	2 5 15	2 9 6
20	1 19 11	1 22 11	1 25 13	1 28 21	1 31 33	1 34 48	1 38 7	1 41 29	1 44 55	1 48 25	1 51 59	1 55 36	1 59 17	2 3 0	2 6 46
21	1 17 48	1 20 44	1 23 43	1 26 48	1 29 57	1 33 8	1 36 23	1 39 42	1 43 4	1 46 30	1 50 0	1 53 33	1 57 10	2 0 49	2 4 31
22	1 16 27	1 19 19	1 22 16	1 25 17	1 28 23	1 31 30	1 34 42	1 37 57	1 41 16	1 44 38	1 48 4	1 51 33	1 55 6	1 58 41	2 2 19
23	1 15 7	1 17 57	1 20 51	1 23 49	1 26 51	1 29 55	1 33 3	1 36 14	1 39 29	1 42 47	1 46 9	1 49 34	1 53 3	1 56 34	2 0 9

LATITUDE 33° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 39	0 10 48	0 11 3	0 11 24	0 11 51	0 12 25	0 13 4	0 13 50	0 14 41	0 15 39	0 16 41	0 17 51	0 19 6	0 20 28	0 21 55
1	0 10 40	0 10 49	0 11 5	0 11 27	0 11 55	0 12 29	0 13 10	0 13 57	0 14 50	0 15 49	0 16 53	0 18 5	0 19 22	0 20 47	0 22 17
2	0 10 42	0 10 50	0 11 7	0 11 30	0 11 59	0 12 33	0 13 16	0 14 4	0 14 59	0 16 0	0 17 6	0 18 20	0 19 39	0 21 7	0 22 40
3	0 10 43	0 10 52	0 11 9	0 11 33	0 12 3	0 12 38	0 13 23	0 14 12	0 15 9	0 16 12	0 17 20	0 18 36	0 19 57	0 21 28	0 23 4
4	0 10 45	0 10 54	0 11 11	0 11 36	0 12 7	0 12 43	0 13 30	0 14 20	0 15 19	0 16 24	0 17 35	0 18 53	0 20 16	0 21 50	0 23 29
5	0 10 46	0 10 56	0 11 13	0 11 39	0 12 11	0 12 48	0 13 37	0 14 29	0 15 30	0 16 36	0 17 50	0 19 10	0 20 36	0 22 13	0 23 54
6	0 10 48	0 10 58	0 11 15	0 11 42	0 12 15	0 12 53	0 13 44	0 14 38	0 15 41	0 16 49	0 18 6	0 19 28	0 20 57	0 22 37	0 24 20
7	0 10 49	0 11 0	0 11 17	0 11 45	0 12 19	0 12 58	0 13 51	0 14 47	0 15 52	0 17 2	0 18 22	0 19 46	0 21 18	0 23 1	0 24 47
8	0 10 51	0 11 2	0 11 20	0 11 48	0 12 23	0 13 3	0 13 58	0 14 56	0 16 3	0 17 15	0 18 38	0 20 5	0 21 40	0 23 26	0 25 15
9	0 10 52	0 11 4	0 11 23	0 11 52	0 12 27	0 13 8	0 14 5	0 15 6	0 16 14	0 17 28	0 18 54	0 20 24	0 22 3	0 23 52	0 25 45
10	0 10 54	0 11 6	0 11 26	0 11 56	0 12 32	0 13 14	0 14 13	0 15 15	0 16 26	0 17 42	0 19 11	0 20 44	0 22 27	0 24 20	0 26 18
11	0 10 55	0 11 8	0 11 29	0 12 1	0 12 37	0 13 20	0 14 21	0 15 25	0 16 38	0 17 57	0 19 29	0 21 6	0 22 53	0 24 50	0 26 54
12	0 10 56	0 11 10	0 11 32	0 12 6	0 12 42	0 13 27	0 14 30	0 15 36	0 16 51	0 18 14	0 19 49	0 21 31	0 23 23	0 25 24	0 27 34
13	0 10 58	0 11 12	0 11 35	0 12 11	0 12 47	0 13 35	0 14 40	0 15 48	0 17 6	0 18 33	0 20 12	0 21 59	0 23 56	0 26 2	0 28 18
14	0 10 59	0 11 14	0 11 39	0 12 16	0 12 53	0 13 44	0 14 51	0 16 1	0 17 23	0 18 55	0 20 38	0 22 30	0 24 33	0 26 40	0 29 6
15	0 11 1	0 11 16	0 11 43	0 12 21	0 13 0	0 13 54	0 15 3	0 16 16	0 17 42	0 19 19	0 21 7	0 23 5	0 25 14	0 27 31	0 29 59
16	0 11 2	0 11 18	0 11 47	0 12 26	0 13 8	0 14 5	0 15 16	0 16 33	0 18 4	0 19 47	0 21 40	0 23 44	0 25 59	0 28 23	0 30 58
17	0 11 4	0 11 20	0 11 51	0 12 31	0 13 17	0 14 18	0 15 31	0 16 54	0 18 30	0 20 19	0 22 17	0 24 28	0 26 50	0 29 22	0 32 5
18	0 11 5	0 11 23	0 11 55	0 12 37	0 13 27	0 14 33	0 15 49	0 17 18	0 19 0	0 20 55	0 22 59	0 25 18	0 27 48	0 30 29	0 33 21
19	0 11 7	0 11 26	0 11 59	0 12 43	0 13 38	0 14 50	0 16 10	0 17 46	0 19 34	0 21 36	0 23 48	0 26 15	0 28 54	0 31 45	0 34 47
20	0 11 8	0 11 29	0 12 3	0 12 49	0 13 51	0 15 9	0 16 35	0 18 18	0 20 13	0 22 23	0 24 44	0 27 21	0 30 9	0 33 11	0 36 25
21	0 11 9	0 11 32	0 12 8	0 12 57	0 14 5	0 15 29	0 17 3	0 18 54	0 20 57	0 23 17	0 25 49	0 28 36	0 31 35	0 34 49	0 38 17
22	0 11 11	0 11 35	0 12 14	0 13 8	0 14 22	0 15 51	0 17 34	0 19 33	0 21 46	0 24 18	0 27 3	0 30 1	0 33 14	0 36 43	0 40 26
23	0 11 13	0 11 38	0 12 21	0 13 21	0 14 42	0 16 16	0 18 9	0 20 17	0 22 41	0 25 28	0 28 27	0 31 38	0 35 10	0 38 56	0 42 57

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 39	0 10 48	0 11 3	0 11 24	0 11 51	0 12 25	0 13 4	0 13 50	0 14 41	0 15 39	0 16 41	0 17 51	0 19 6	0 20 28	0 21 55
1	0 10 37	0 10 46	0 11 0	0 11 22	0 11 47	0 12 21	0 12 59	0 13 44	0 14 34	0 15 30	0 16 31	0 17 39	0 18 52	0 20 11	0 21 36
2	0 10 36	0 10 44	0 10 57	0 11 20	0 11 43	0 12 17	0 12 54	0 13 38	0 14 27	0 15 21	0 16 21	0 17 27	0 18 38	0 19 55	0 21 18
3	0 10 34	0 10 42	0 10 54	0 11 18	0 11 39	0 12 13	0 12 49	0 13 32	0 14 20	0 15 12	0 16 11	0 17 15	0 18 25	0 19 39	0 20 1
4	0 10 32	0 10 40	0 10 52	0 11 15	0 11 36	0 12 9	0 12 44	0 13 26	0 14 13	0 15 4	0 16 1	0 17 4	0 18 12	0 19 24	0 20 44
5	0 10 30	0 10 38	0 10 50	0 11 12	0 11 33	0 12 5	0 12 39	0 13 20	0 14 6	0 14 56	0 15 51	0 16 53	0 17 59	0 19 9	0 20 27
6	0 10 28	0 10 36	0 10 48	0 11 9	0 11 30	0 12 1	0 12 34	0 13 14	0 13 59	0 14 48	0 15 42	0 16 42	0 17 46	0 18 55	0 20 11
7	0 10 26	0 10 34	0 10 46	0 11 6	0 11 27	0 11 57	0 12 29	0 13 8	0 13 52	0 14 40	0 15 33	0 16 31	0 17 34	0 18 41	0 19 55
8	0 10 24	0 10 32	0 10 44	0 11 3	0 11 24	0 11 53	0 12 24	0 13 2	0 13 45	0 14 32	0 15 24	0 16 21	0 17 22	0 18 28	0 19 40
9	0 10 23	0 10 30	0 10 42	0 11 0	0 11 21	0 11 49	0 12 19	0 12 56	0 13 38	0 14 24	0 15 15	0 16 11	0 17 11	0 18 16	0 19 26
10	0 10 21	0 10 28	0 10 40	0 10 57	0 11 18	0 11 44	0 12 15	0 12 51	0 13 31	0 14 16	0 15 6	0 16 1	0 17 0	0 18 4	0 19 13
11	0 10 19	0 10 26	0 10 38	0 10 54	0 11 15	0 11 39	0 12 11	0 12 46	0 13 24	0 14 9	0 14 58	0 15 52	0 16 50	0 17 52	0 19 0
12	0 10 17	0 10 24	0 10 35	0 10 51	0 11 12	0 11 35	0 12 7	0 12 41	0 13 18	0 14 2	0 14 50	0 15 43	0 16 40	0 17 41	0 18 47
13	0 10 15	0 10 22	0 10 32	0 10 48	0 11 9	0 11 31	0 12 3	0 12 36	0 13 12	0 13 55	0 14 42	0 15 34	0 16 30	0 17 30	0 18 34
14	0 10 13	0 10 19	0 10 29	0 10 45	0 11 6	0 11 27	0 11 58	0 12 31	0 13 6	0 13 48	0 14 34	0 15 25	0 16 20	0 17 19	0 18 21
15	0 10 11	0 10 16	0 10 26	0 10 42	0 11 2	0 11 23	0 11 53	0 12 26	0 13 0	0 13 41	0 14 26	0 15 16	0 16 10	0 17 8	0 18 9
16	0 10 9	0 10 13	0 10 23	0 10 39	0 10 58	0 11 19	0 11 48	0 12 21	0 12 54	0 13 34	0 14 18	0 15 7	0 16 0	0 16 57	0 17 57
17	0 10 7	0 10 10	0 10 20	0 10 36	0 10 54	0 11 15	0 11 43	0 12 16	0 12 48	0 13 27	0 14 10	0 14 58	0 15 50	0 16 46	0 17 45
18	0 10 4	0 10 7	0 10 17	0 10 32	0 10 50	0 11 11	0 11 38	0 12 10	0 12 42	0 13 20	0 14 2	0 14 49	0 15 40	0 16 35	0 17 33
19	0 10 1	0 10 4	0 10 14	0 10 28	0 10 46	0 11 7	0 11 33	0 12 4	0 12 36	0 13 13	0 13 55	0 14 40	0 15 30	0 16 24	0 17 21
20	0 9 55	0 10 1	0 10 11	0 10 24	0 10 42	0 11 3	0 11 28	0 11 58	0 12 30	0 13 7	0 13 48	0 14 32	0 15 21	0 16 13	0 17 9
21	0 9 52	0 9 58	0 10 8	0 10 20	0 10 38	0 10 59	0 11 23	0 11 52	0 12 24	0 13 0	0 13 41	0 14 24	0 15 12	0 16 2	0 16 57
22	0 9 49	0 9 55	0 10 4	0 10 16	0 10 34	0 10 54	0 11 18	0 11 46	0 12 18	0 12 53	0 13 33	0 14 16	0 15 2	0 15 52	0 16 46
23	0 9 45	0 9 51	0 10 0	0 10 13	0 10 29	0 10 49	0 11 13	0 11 40	0 12 12	0 12 46	0 13 25	0 14 7	0 14 52	0 15 42	0 16 35

LATITUDE 33° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 23 28	0 25 7	0 26 52	0 28 42	0 30 39	0 32 42	0 34 50	0 37 5	0 39 25	0 41 51	0 44 23	0 47 0	0 49 43	0 52 32	0 55 27
1	0 23 53	0 25 33	0 27 21	0 29 15	0 31 14	0 33 20	0 35 32	0 37 49	0 40 13	0 42 43	0 45 19	0 48 1	0 50 49	0 53 42	0 56 42
2	0 24 18	0 26 0	0 27 51	0 29 49	0 31 50	0 34 0	0 36 16	0 38 36	0 41 4	0 43 38	0 46 18	0 49 5	0 51 58	0 54 56	0 58 0
3	0 24 44	0 26 28	0 28 22	0 30 24	0 32 28	0 34 42	0 37 2	0 39 26	0 41 58	0 44 36	0 47 20	0 50 12	0 53 10	0 56 13	0 59 21
4	0 25 11	0 26 57	0 28 55	0 31 1	0 33 8	0 35 26	0 37 50	0 40 19	0 42 55	0 45 37	0 48 26	0 51 23	0 54 26	0 57 34	1 0 46
5	0 25 39	0 27 28	0 29 30	0 31 40	0 33 51	0 36 13	0 38 41	0 41 15	0 43 55	0 46 42	0 49 36	0 52 38	0 55 47	0 59 0	1 2 19
6	0 26 8	0 28 1	0 30 7	0 32 21	0 34 37	0 37 3	0 39 36	0 42 16	0 45 1	0 47 52	0 50 51	0 53 58	0 57 13	1 0 32	1 3 59
7	0 26 39	0 28 36	0 30 46	0 33 5	0 35 26	0 37 57	0 40 35	0 43 21	0 46 11	0 49 7	0 52 11	0 55 24	0 58 45	1 2 10	1 5 44
8	0 27 12	0 29 14	0 31 28	0 33 52	0 36 18	0 38 54	0 41 37	0 44 29	0 47 25	0 50 27	0 53 37	0 56 56	1 0 23	1 3 55	1 7 36
9	0 27 47	0 29 55	0 32 13	0 34 42	0 37 14	0 39 55	0 42 43	0 45 41	0 48 43	0 51 52	0 55 9	0 58 35	1 2 8	1 5 48	1 9 34
10	0 28 25	0 30 39	0 33 1	0 35 35	0 38 14	0 41 0	0 43 54	0 46 58	0 50 6	0 53 24	0 56 48	1 0 22	1 4 2	1 7 49	1 11 42
11	0 29 7	0 31 27	0 33 56	0 36 36	0 39 19	0 42 12	0 45 12	0 48 22	0 51 38	0 55 2	0 58 34	1 2 17	1 6 5	1 9 59	1 14 1
12	0 29 53	0 32 19	0 34 55	0 37 41	0 40 30	0 43 30	0 46 37	0 49 54	0 53 19	0 56 50	1 0 30	1 4 21	1 8 18	1 12 21	1 16 33
13	0 30 43	0 33 16	0 35 59	0 38 52	0 41 49	0 44 54	0 48 10	0 51 34	0 55 7	0 58 48	1 2 38	1 6 36	1 10 41	1 14 55	1 19 18
14	0 31 38	0 34 18	0 37 9	0 40 10	0 43 11	0 46 26	0 49 51	0 53 24	0 57 7	1 0 57	1 4 56	1 9 4	1 13 19	1 17 44	1 22 17
15	0 32 38	0 35 26	0 38 25	0 41 35	0 44 43	0 48 7	0 51 40	0 55 24	0 59 17	1 3 18	1 7 26	1 11 44	1 16 12	1 20 48	1 25 31
16	0 33 44	0 36 41	0 39 49	0 43 8	0 46 25	0 50 0	0 53 43	0 57 37	1 1 40	1 5 53	1 10 15	1 14 44	1 19 24	1 24 12	1 29 7
17	0 34 59	0 38 5	0 41 23	0 44 52	0 48 19	0 52 6	0 56 2	1 0 6	1 4 19	1 8 44	1 13 20	1 18 4	1 22 57	1 27 58	1 33 7
18	0 36 24	0 39 40	0 43 8	0 46 48	0 50 28	0 54 27	0 58 35	1 2 52	1 7 18	1 11 56	1 16 47	1 21 47	1 26 52	1 32 9	1 37 33
19	0 38 1	0 41 27	0 45 6	0 48 58	0 52 53	0 57 4	1 1 25	1 5 56	1 10 38	1 15 30	1 20 37	1 25 55	1 31 13	1 36 48	1 42 32
20	0 39 50	0 43 28	0 47 19	0 51 24	0 55 35	1 0 2	1 4 38	1 9 29	1 14 28	1 19 38	1 24 57	1 30 30	1 36 16	1 42 5	1 48 7
21	0 41 56	0 45 48	0 49 51	0 54 11	0 58 45	1 3 29	1 8 23	1 13 29	1 18 47	1 24 16	1 29 57	1 35 49	1 41 54	1 48 7	1 54 28
22	0 44 22	0 48 32	0 52 53	0 57 31	1 2 25	1 7 27	1 12 41	1 18 8	1 23 48	1 29 40	1 35 45	1 41 59	1 48 23	1 54 59	2 1 47
23	0 47 13	0 51 44	0 56 28	1 1 28	1 6 43	1 12 7	1 17 43	1 23 36	1 29 41	1 35 55	1 42 26	1 49 4	1 55 57	2 2 57	2 10 7

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 23 28	0 25 7	0 26 52	0 28 42	0 30 39	0 32 42	0 34 50	0 37 5	0 39 25	0 41 51	0 44 23	0 47 0	0 49 43	0 52 32	0 55 27
1	0 23 8	0 24 44	0 26 27	0 28 14	0 30 8	0 32 7	0 34 11	0 36 21	0 38 37	0 41 0	0 43 29	0 46 2	0 48 41	0 51 26	0 54 16
2	0 22 48	0 24 22	0 26 2	0 27 47	0 29 38	0 31 33	0 33 33	0 35 39	0 37 52	0 40 12	0 42 37	0 45 7	0 47 42	0 50 23	0 53 8
3	0 22 29	0 24 1	0 25 38	0 27 21	0 29 9	0 31 1	0 32 57	0 34 59	0 37 10	0 39 27	0 41 48	0 44 14	0 46 46	0 49 23	0 52 3
4	0 22 10	0 23 40	0 25 15	0 26 55	0 28 41	0 30 30	0 32 23	0 34 22	0 36 30	0 38 44	0 41 2	0 43 24	0 45 52	0 48 25	0 51 1
5	0 21 51	0 23 19	0 24 52	0 26 30	0 28 14	0 30 0	0 31 51	0 33 47	0 35 52	0 38 3	0 40 18	0 42 36	0 45 0	0 47 29	0 50 2
6	0 21 33	0 22 59	0 24 30	0 26 6	0 27 47	0 29 31	0 31 20	0 33 14	0 35 16	0 37 24	0 39 36	0 41 50	0 44 10	0 46 35	0 49 5
7	0 21 15	0 22 39	0 24 8	0 25 42	0 27 21	0 29 3	0 30 50	0 32 42	0 34 41	0 36 46	0 38 55	0 41 6	0 43 22	0 45 44	0 48 11
8	0 20 58	0 22 20	0 23 47	0 25 19	0 26 56	0 28 36	0 30 21	0 32 11	0 34 7	0 36 9	0 38 15	0 40 23	0 42 37	0 44 56	0 47 20
9	0 20 42	0 22 2	0 23 27	0 24 57	0 26 32	0 28 10	0 29 53	0 31 41	0 33 34	0 35 33	0 37 36	0 39 41	0 41 54	0 44 10	0 46 31
10	0 20 27	0 21 45	0 23 8	0 24 36	0 26 9	0 27 45	0 29 26	0 31 12	0 33 2	0 34 58	0 36 58	0 39 3	0 41 12	0 43 26	0 45 44
11	0 20 12	0 21 28	0 22 49	0 24 15	0 25 46	0 27 20	0 28 59	0 30 44	0 32 31	0 34 24	0 36 21	0 38 23	0 40 31	0 42 43	0 44 58
12	0 19 57	0 21 12	0 22 31	0 23 55	0 25 24	0 26 56	0 28 33	0 30 16	0 32 1	0 33 51	0 35 46	0 37 45	0 39 51	0 42 1	0 44 13
13	0 19 43	0 20 56	0 22 13	0 23 36	0 25 3	0 26 33	0 28 8	0 29 49	0 31 32	0 33 19	0 35 12	0 37 8	0 39 12	0 41 20	0 43 29
14	0 19 29	0 20 40	0 21 56	0 23 17	0 24 43	0 26 11	0 27 44	0 29 23	0 31 4	0 32 48	0 34 39	0 36 33	0 38 34	0 40 40	0 42 46
15	0 19 15	0 20 25	0 21 39	0 22 59	0 24 23	0 25 49	0 27 20	0 28 57	0 30 37	0 32 18	0 34 7	0 35 59	0 37 57	0 40 1	0 42 4
16	0 19 1	0 20 10	0 21 23	0 22 41	0 24 4	0 25 28	0 26 57	0 28 32	0 30 10	0 31 50	0 33 36	0 35 26	0 37 21	0 39 20	0 41 23
17	0 18 48	0 19 55	0 21 7	0 22 23	0 23 45	0 25 7	0 26 34	0 28 7	0 29 44	0 31 22	0 33 6	0 34 54	0 36 46	0 38 44	0 40 43
18	0 18 35	0 19 41	0 20 51	0 22 6	0 23 26	0 24 47	0 26 12	0 27 43	0 29 18	0 30 55	0 32 37	0 34 23	0 36 12	0 38 7	0 40 4
19	0 18 22	0 19 27	0 20 36	0 21 49	0 23 7	0 24 27	0 25 51	0 27 20	0 28 53	0 30 29	0 32 8	0 33 52	0 35 39	0 37 31	0 39 26
20	0 18 9	0 19 13	0 20 21	0 21 32	0 22 48	0 24 7	0 25 30	0 26 57	0 28 28	0 30 3	0 31 40	0 33 22	0 35 7	0 36 56	0 38 49
21	0 17 56	0 18 59	0 20 6	0 21 15	0 22 29	0 23 47	0 25 9	0 26 34	0 28 4	0 29 37	0 31 12	0 32 52	0 34 35	0 36 22	0 38 13
22	0 17 43	0 18 45	0 19 51	0 20 59	0 22 11	0 23 28	0 24 48	0 26 12	0 27 40	0 29 11	0 30 45	0 32 23	0 34 4	0 35 49	0 37 37
23	0 17 31	0 18 32	0 19 36	0 20 43	0 21 54	0 23 9	0 24 28	0 25 50	0 27 16	0 28 45	0 30 18	0 31 54	0 33 33	0 35 16	0 37 2

LATITUDE 33° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 58 26	1 1 32	1 4 44	1 8 1	1 11 23	1 14 51	1 18 25	1 22 4	1 25 48	1 29 39	1 33 33	1 37 34	1 41 39	1 45 50	1 50 7
1	0 59 46	1 2 57	1 6 14	1 9 36	1 13 4	1 16 37	1 20 16	1 24 1	1 27 51	1 31 47	1 35 48	1 39 55	1 44 6	1 48 24	1 52 48
2	1 1 9	1 4 25	1 7 47	1 11 15	1 14 48	1 18 27	1 22 12	1 26 4	1 29 59	1 34 1	1 38 8	1 42 21	1 46 39	1 51 4	1 55 34
3	1 2 36	1 5 57	1 9 24	1 12 57	1 16 36	1 20 21	1 24 12	1 28 9	1 32 12	1 36 20	1 40 34	1 44 53	1 49 18	1 53 50	1 58 27
4	1 4 7	1 7 35	1 11 8	1 14 46	1 18 31	1 22 22	1 26 20	1 30 24	1 34 33	1 38 48	1 43 9	1 47 35	1 52 7	1 56 46	2 1 30
5	1 5 46	1 9 19	1 12 58	1 16 42	1 20 34	1 24 32	1 28 36	1 32 47	1 37 3	1 41 25	1 45 53	1 50 27	1 55 7	1 59 52	2 4 43
6	1 7 31	1 11 10	1 14 56	1 18 48	1 22 46	1 26 51	1 31 1	1 35 18	1 39 42	1 44 12	1 48 48	1 53 29	1 58 17	2 3 10	2 8 9
7	1 9 23	1 13 8	1 17 1	1 21 1	1 25 7	1 29 19	1 33 36	1 37 59	1 42 31	1 47 10	1 51 54	1 56 43	2 1 39	2 6 41	2 11 49
8	1 11 22	1 15 14	1 19 15	1 23 23	1 27 37	1 31 56	1 36 21	1 40 52	1 45 32	1 50 20	1 55 13	2 0 10	2 5 14	2 10 26	2 15 44
9	1 13 29	1 17 30	1 21 38	1 25 53	1 30 16	1 34 45	1 39 20	1 44 1	1 48 47	1 53 43	1 58 45	2 3 52	2 9 6	2 14 27	2 19 53
10	1 15 45	1 19 55	1 24 11	1 28 33	1 33 4	1 37 43	1 42 28	1 47 19	1 52 17	1 57 22	2 2 33	2 7 50	2 13 14	2 18 44	2 24 18
11	1 18 13	1 22 32	1 26 58	1 31 29	1 36 9	1 40 57	1 45 52	1 50 54	1 56 2	2 1 17	2 6 37	2 12 4	2 17 38	2 23 19	2 29 6
12	1 20 54	1 25 22	1 29 58	1 34 40	1 39 30	1 44 27	1 49 32	1 54 45	2 0 4	2 5 30	2 11 1	2 16 39	2 22 24	2 28 17	2 34 18
13	1 23 48	1 28 26	1 33 12	1 38 6	1 43 7	1 48 14	1 53 30	1 58 54	2 4 25	2 10 2	2 15 45	2 21 36	2 27 34	2 33 41	2 39 54
14	1 26 58	1 31 47	1 36 44	1 41 49	1 47 1	1 52 19	1 57 49	2 3 25	2 9 8	2 14 56	2 20 52	2 26 57	2 33 8	2 39 27	2 45 55
15	1 30 25	1 35 27	1 40 36	1 45 53	1 51 18	1 56 52	2 2 34	2 8 24	2 14 20	2 20 21	2 26 31	2 32 51	2 39 17	2 45 48	2 52 27
16	1 34 14	1 39 30	1 44 53	1 50 23	1 56 3	2 1 51	2 7 45	2 13 46	2 19 56	2 26 16	2 42 43	2 39 16	2 45 55	2 52 41	2 59 35
17	1 38 28	1 43 57	1 49 34	1 55 19	2 1 13	2 7 16	2 13 27	2 19 46	2 26 13	2 32 47	2 39 28	2 46 17	2 53 13	3 0 17	3 7 27
18	1 43 9	1 48 53	1 54 46	2 0 48	2 6 59	2 13 18	2 19 46	2 26 22	2 33 4	2 39 54	2 46 53	2 54 0	3 1 14	3 8 35	3 16 2
19	1 48 26	1 54 28	2 0 39	2 6 59	2 13 27	2 20 3	2 26 48	2 33 41	2 40 43	2 47 54	2 55 11	3 2 34	3 10 6	3 17 47	3 25 34
20	1 54 19	2 0 40	2 7 9	2 13 47	2 20 35	2 27 33	2 34 39	2 41 54	2 49 16	2 56 44	3 4 21	3 12 7	3 19 58	3 27 55	3 36 1
21	2 1 2	2 7 45	2 14 36	2 21 34	2 28 43	2 36 2	2 43 30	2 51 6	2 58 50	3 6 41	3 14 39	3 22 44	3 30 58	3 39 21	3 47 49
22	2 8 41	2 15 45	2 23 0	2 30 26	2 38 0	2 45 41	2 53 32	3 1 32	3 9 38	3 17 50	3 26 12	3 34 44	3 43 22	3 52 5	4 0 54
23	2 17 29	2 25 1	2 32 43	2 40 34	2 48 32	2 56 38	3 4 54	3 13 21	3 21 54	3 30 33	3 39 20	3 48 14	3 57 15	4 6 24	4 15 38

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 58 26	1 1 32	1 4 44	1 8 1	1 11 23	1 14 51	1 18 25	1 22 4	1 25 48	1 29 39	1 33 33	1 37 34	1 41 39	1 45 50	1 50 7
1	0 57 16	1 0 15	1 3 22	1 6 34	1 9 51	1 13 14	1 16 43	1 20 17	1 23 55	1 27 42	1 31 32	1 35 26	1 39 24	1 43 30	1 47 41
2	0 56 7	0 59 1	1 2 3	1 5 10	1 8 23	1 11 41	1 15 5	1 18 34	1 22 7	1 25 49	1 29 34	1 33 22	1 37 14	1 41 15	1 45 21
3	0 55 0	0 57 50	1 0 47	1 3 49	1 6 58	1 10 12	1 13 31	1 16 55	1 20 23	1 24 0	1 27 40	1 31 23	1 35 9	1 39 5	1 43 6
4	0 53 55	0 56 41	0 59 34	1 2 31	1 5 36	1 8 46	1 12 1	1 15 20	1 18 43	1 22 15	1 25 50	1 29 28	1 33 9	1 37 0	1 40 56
5	0 52 52	0 55 35	0 58 24	1 1 16	1 4 17	1 7 23	1 10 34	1 13 49	1 17 7	1 20 34	1 24 4	1 27 37	1 31 13	1 34 59	1 38 50
6	0 51 51	0 54 31	0 57 16	1 0 4	1 3 1	1 6 3	1 9 10	1 12 21	1 15 35	1 18 57	1 22 22	1 25 50	1 29 21	1 33 2	1 36 48
7	0 50 52	0 53 29	0 56 10	0 58 55	1 1 48	1 4 46	1 7 49	1 10 56	1 14 6	1 17 23	1 20 43	1 24 7	1 27 33	1 31 9	1 34 50
8	0 49 55	0 52 29	0 55 7	0 57 49	1 0 38	1 3 32	1 6 31	1 9 34	1 12 40	1 15 52	1 19 7	1 22 27	1 25 49	1 29 20	1 32 56
9	0 49 0	0 51 31	0 54 6	0 56 45	0 59 30	1 2 20	1 5 15	1 8 14	1 11 16	1 14 23	1 17 34	1 20 50	1 24 9	1 27 35	1 31 6
10	0 48 7	0 50 35	0 53 7	0 55 43	0 58 24	1 1 10	1 4 1	1 6 56	1 9 54	1 12 57	1 16 4	1 19 16	1 22 33	1 25 54	1 29 20
11	0 47 16	0 49 41	0 52 10	0 54 43	0 57 20	1 0 3	1 2 50	1 5 41	1 8 36	1 11 34	1 14 37	1 17 46	1 21 0	1 24 16	1 27 38
12	0 46 27	0 48 49	0 51 15	0 53 45	0 56 19	0 58 59	1 1 41	1 4 29	1 7 20	1 10 14	1 13 14	1 16 19	1 19 30	1 22 42	1 25 59
13	0 45 40	0 47 59	0 50 22	0 52 49	0 55 19	0 57 56	1 0 35	1 3 20	1 6 7	1 8 58	1 11 54	1 14 55	1 18 3	1 21 11	1 24 24
14	0 44 55	0 47 11	0 49 31	0 51 54	0 54 21	0 56 55	0 59 31	1 2 13	1 4 57	1 7 45	1 10 37	1 13 34	1 16 39	1 19 43	1 22 52
15	0 44 11	0 46 24	0 48 41	0 51 1	0 53 25	0 55 56	0 58 29	1 1 8	1 3 49	1 6 34	1 9 23	1 12 16	1 15 18	1 18 18	1 21 23
16	0 43 28	0 45 38	0 47 53	0 50 10	0 52 31	0 54 59	0 57 29	1 0 5	1 2 43	1 5 25	1 8 11	1 11 1	1 13 59	1 16 56	1 19 57
17	0 42 46	0 44 53	0 47 6	0 49 21	0 51 39	0 54 4	0 56 31	0 59 4	1 1 39	1 4 18	1 7 1	1 9 48	1 12 42	1 15 36	1 18 34
18	0 42 5	0 44 10	0 46 20	0 48 33	0 50 49	0 53 11	0 55 35	0 58 5	1 0 37	1 3 13	1 5 53	1 8 37	1 11 27	1 14 18	1 17 13
19	0 41 25	0 43 28	0 45 35	0 47 46	0 50 0	0 52 19	0 54 41	0 57 8	0 59 37	1 2 10	1 4 47	1 7 28	1 10 14	1 13 2	1 15 54
20	0 40 46	0 42 47	0 44 51	0 47 0	0 49 12	0 51 28	0 53 48	0 56 12	0 58 39	1 1 9	1 3 43	1 6 21	1 9 3	1 11 48	1 14 37
21	0 40 8	0 42 6	0 44 8	0 46 15	0 48 24	0 50 38	0 52 55	0 55 16	0 57 41	1 0 8	1 2 39	1 5 14	1 7 53	1 10 36	1 13 22
22	0 39 30	0 41 26	0 43 26	0 45 31	0 47 37	0 49 48	0 52 3	0 54 21	0 56 43	0 59 8	1 1 36	1 4 8	1 6 44	1 9 24	1 12 7
23	0 38 53	0 40 46	0 42 45	0 44 47	0 46 51	0 48 59	0 51 11	0 53 27	0 55 46	0 58 8	1 0 34	1 3 3	1 5 36	1 8 13	1 10 53

LATITUDE 33° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 54 29	1 58 55	2 3 27	2 8 4	2 12 45	2 17 33	2 22 25	2 27 22	2 32 24	2 37 31	2 42 43	2 48 0	2 53 20	2 58 47	3 4 18
1	1 57 16	2 1 45	2 6 24	2 11 8	2 15 56	2 20 51	2 25 50	2 30 54	2 36 3	2 41 17	2 46 36	2 52 0	2 57 28	3 3 2	3 8 41
2	2 0 9	2 4 44	2 9 30	2 14 21	2 19 17	2 24 19	2 29 25	2 34 37	2 39 53	2 45 15	2 50 41	2 56 12	3 1 48	3 7 29	3 13 17
3	2 3 8	2 7 52	2 12 46	2 17 44	2 22 48	2 27 57	2 33 11	2 38 31	2 43 56	2 49 25	2 54 58	3 0 36	3 6 20	3 12 10	3 18 7
4	2 6 19	2 11 12	2 16 12	2 21 18	2 26 30	2 31 47	2 37 9	2 42 37	2 48 10	2 53 48	2 59 29	3 5 15	3 11 7	3 17 6	3 23 12
5	2 9 41	2 14 44	2 19 51	2 25 5	2 30 25	2 35 50	2 41 20	2 46 56	2 52 38	2 58 24	3 4 14	3 10 9	3 16 10	3 22 18	3 28 32
6	2 13 15	2 18 26	2 23 42	2 29 5	2 34 34	2 40 8	2 45 46	2 51 31	2 57 22	3 3 18	3 9 18	3 15 22	3 21 32	3 27 49	3 34 12
7	2 17 3	2 22 23	2 27 49	2 33 20	2 38 58	2 44 41	2 50 28	2 56 22	3 2 23	3 8 29	3 14 40	3 20 54	3 27 14	3 33 40	3 40 13
8	2 21 7	2 26 36	2 32 12	2 37 53	2 43 40	2 49 32	2 55 29	3 1 33	3 7 44	3 14 0	3 20 22	3 26 48	3 33 17	3 39 53	3 46 35
9	2 25 28	2 31 6	2 36 52	2 42 43	2 48 41	2 54 43	3 0 51	3 7 5	3 13 25	3 19 51	3 26 24	3 33 1	3 39 41	3 46 28	3 53 20
10	2 30 6	2 35 55	2 41 50	2 47 52	2 54 1	3 0 15	3 6 35	3 12 59	3 19 28	3 26 5	3 32 48	3 39 36	3 46 28	3 53 26	4 0 29
11	2 35 4	2 41 4	2 47 11	2 53 25	2 59 45	3 6 11	3 12 43	3 19 19	3 26 1	3 32 50	3 39 45	3 46 45	3 53 50	4 1 0	4 8 15
12	2 40 26	2 46 37	2 52 56	2 59 22	3 5 53	3 12 31	3 19 15	3 26 4	3 32 59	3 40 0	3 47 7	3 54 19	4 1 37	4 9 0	4 16 27
13	2 46 12	2 52 36	2 59 8	3 5 46	3 12 29	3 19 19	3 26 16	3 33 18	3 40 26	3 47 39	3 54 58	4 2 23	4 9 54	4 17 30	4 25 10
14	2 52 28	2 59 6	3 5 51	3 12 42	3 19 40	3 26 41	3 33 52	3 41 8	3 48 28	3 55 54	4 3 27	4 11 4	4 18 48	4 26 34	4 34 32
15	2 59 15	3 6 8	3 13 5	3 20 10	3 27 23	3 34 42	3 42 7	3 49 36	3 57 9	4 4 49	4 12 31	4 20 28	4 28 26	4 36 30	4 44 39
16	3 6 38	3 13 46	3 20 58	3 28 18	3 35 47	3 43 21	3 51 1	3 58 46	4 6 35	4 14 30	4 22 32	4 30 39	4 38 51	4 47 10	4 55 36
17	3 14 43	3 22 7	3 29 38	3 37 15	3 44 59	3 52 49	4 0 44	4 8 45	4 16 52	4 25 6	4 33 27	4 51 51	4 50 19	4 58 54	5 7 36
18	3 23 36	3 31 17	3 39 6	3 47 1	3 55 3	4 3 10	4 11 21	4 19 39	4 28 4	4 36 34	4 45 8	4 53 49	5 2 36	5 11 27	5 20 23
19	3 33 26	3 41 25	3 49 31	3 57 43	4 6 2	4 14 28	4 23 0	4 31 37	4 40 19	4 49 7	4 58 1	5 7 0	5 16 4	5 25 13	5 34 26
20	3 44 17	3 52 37	4 1 2	4 9 34	4 18 14	4 26 58	4 35 47	4 44 43	4 53 45	5 2 52	5 12 4	5 21 19	5 30 38	5 40 4	5 49 38
21	3 56 21	4 5 0	4 13 47	4 22 41	4 31 41	4 40 46	4 49 56	4 59 12	5 8 34	5 17 59	5 27 28	5 37 2	5 46 46	5 56 29	6 6 17
22	4 9 49	4 18 51	4 28 0	4 37 16	4 46 38	4 56 5	5 5 37	5 15 3	5 24 53	5 34 40	5 44 33	5 54 29	6 4 27	6 14 31	6 24 42
23	4 24 56	4 34 21	4 43 54	4 53 32	5 3 16	5 13 5	5 23 0	5 32 58	5 43 0	5 53 7	6 3 20	6 13 35	6 23 52	6 34 17	6 44 51

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 54 29	1 58 55	2 3 27	2 8 4	2 12 45	2 17 33	2 22 25	2 27 22	2 32 24	2 37 31	2 42 43	2 48 0	2 53 20	2 58 47	3 4 18
1	1 51 57	1 56 18	2 0 45	2 5 15	2 9 51	2 14 32	2 19 16	2 24 7	2 29 3	2 34 3	2 39 6	2 44 14	2 49 27	2 54 48	3 0 13
2	1 49 31	1 53 47	1 58 8	2 2 32	2 7 2	2 11 36	2 16 13	2 20 58	2 25 49	2 30 42	2 35 37	2 40 37	2 45 43	2 50 57	2 56 16
3	1 47 11	1 51 21	1 55 36	1 59 54	2 4 18	2 8 46	2 13 17	2 17 56	2 22 41	2 27 28	2 32 15	2 37 8	2 42 7	2 47 15	2 52 27
4	1 44 56	1 49 0	1 53 9	1 57 21	2 1 39	2 6 2	2 10 27	2 15 0	2 19 39	2 24 20	2 29 0	2 33 47	2 38 39	2 43 41	2 48 46
5	1 42 45	1 46 44	1 50 47	1 54 53	1 59 5	2 3 23	2 7 43	2 12 10	2 16 43	2 21 18	2 25 52	2 30 33	2 35 19	2 40 14	2 45 13
6	1 40 38	1 44 32	1 48 30	1 52 30	1 56 36	2 0 49	2 5 4	2 9 25	2 13 52	2 18 21	2 22 50	2 27 26	2 32 6	2 36 54	2 41 47
7	1 38 35	1 42 24	1 46 17	1 50 12	1 54 12	1 58 20	2 2 30	2 6 45	2 11 6	2 15 29	2 19 54	2 24 25	2 28 59	2 33 41	2 38 28
8	1 36 36	1 40 20	1 44 8	1 47 59	1 51 53	1 55 56	2 0 1	2 4 10	2 8 25	2 12 43	2 17 4	2 21 30	2 25 59	2 30 35	2 35 16
9	1 34 41	1 38 20	1 42 3	1 45 50	1 49 39	1 53 37	1 57 37	2 1 41	2 5 50	2 10 3	2 14 20	2 18 41	2 23 5	2 27 35	2 32 10
10	1 32 50	1 36 24	1 40 2	1 43 45	1 47 32	1 51 23	1 55 18	1 59 17	2 3 21	2 7 29	2 11 42	2 15 58	2 20 17	2 24 41	2 29 10
11	1 31 4	1 34 33	1 38 5	1 41 45	1 45 28	1 49 13	1 53 3	1 56 57	2 0 56	2 5 0	2 9 9	2 13 19	2 17 34	2 21 53	2 26 16
12	1 29 21	1 32 46	1 36 13	1 39 49	1 43 28	1 47 7	1 50 53	1 54 42	1 58 37	2 2 36	2 6 41	2 10 46	2 14 56	2 19 10	2 23 28
13	1 27 42	1 31 3	1 34 25	1 37 57	1 41 32	1 45 6	1 48 48	1 52 32	1 56 23	2 0 17	2 4 18	2 8 18	2 12 23	2 16 32	2 20 45
14	1 26 6	1 29 23	1 32 41	1 36 9	1 39 40	1 43 10	1 46 48	1 50 27	1 54 14	1 58 3	2 2 0	2 5 55	2 9 55	2 13 59	2 18 7
15	1 24 33	1 27 46	1 31 1	1 34 25	1 37 52	1 41 18	1 44 52	1 48 27	1 52 9	1 55 54	1 59 46	2 3 37	2 7 32	2 11 31	2 15 34
16	1 23 3	1 26 12	1 29 24	1 32 44	1 36 7	1 39 30	1 43 0	1 46 31	1 50 8	1 53 49	1 57 36	2 1 23	2 5 13	2 9 8	2 13 7
17	1 21 36	1 24 41	1 27 50	1 31 6	1 34 25	1 37 45	1 41 11	1 44 38	1 48 11	1 51 48	1 55 30	1 59 13	2 2 59	2 6 50	2 10 45
18	1 20 12	1 23 13	1 26 19	1 29 31	1 32 46	1 36 3	1 39 25	1 42 49	1 46 18	1 49 51	1 53 28	1 57 7	2 0 49	2 4 36	2 8 27
19	1 18 50	1 21 48	1 24 51	1 27 59	1 31 10	1 34 24	1 37 42	1 41 3	1 44 28	1 47 57	1 51 30	1 55 5	1 58 43	2 2 26	2 6 13
20	1 17 30	1 20 26	1 23 26	1 26 30	1 29 37	1 32 48	1 36 2	1 39 20	1 42 41	1 46 6	1 49 35	1 53 7	1 56 41	2 0 20	2 4 3
21	1 16 11	1 19 4	1 22 1	1 25 2	1 28 5	1 31 13	1 34 24	1 37 38	1 40 55	1 44 16	1 47 41	1 51 10	1 54 40	1 58 15	2 1 54
22	1 14 53	1 17 43	1 20 37	1 23 35	1 26 34	1 29 38	1 32 46	1 35 57	1 39 10	1 42 27	1 45 48	1 49 13	1 52 40	1 56 11	1 59 46
23	1 13 36	1 16 23	1 19 13	1 22 8	1 25 3	1 28 4	1 31 9	1 34 16	1 37 26	1 40 39	1 43 57	1 47 17	1 50 40	1 54 8	1 57 40

LATITUDE 34° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 38	0 10 47	0 11 1	0 11 22	0 11 47	0 12 20	0 12 58	0 13 41	0 14 31	0 15 26	0 16 27	0 17 34	0 18 46	0 20 4	0 21 28
1	0 10 39	0 10 48	0 11 3	0 11 24	0 11 51	0 12 25	0 13 4	0 13 48	0 14 40	0 15 36	0 16 39	0 17 48	0 19 2	0 20 22	0 21 47
2	0 10 41	0 10 49	0 11 5	0 11 27	0 11 55	0 12 30	0 13 10	0 13 55	0 14 49	0 15 46	0 16 51	0 18 2	0 19 18	0 20 40	0 22 7
3	0 10 42	0 10 50	0 11 7	0 11 30	0 11 59	0 12 35	0 13 16	0 14 2	0 14 59	0 15 57	0 17 4	0 18 17	0 19 37	0 20 59	0 22 28
4	0 10 44	0 10 52	0 11 9	0 11 33	0 12 3	0 12 40	0 13 22	0 14 10	0 15 9	0 16 8	0 17 17	0 18 32	0 19 54	0 21 19	0 22 50
5	0 10 45	0 10 54	0 11 11	0 11 36	0 12 7	0 12 45	0 13 28	0 14 18	0 15 19	0 16 20	0 17 30	0 18 47	0 20 12	0 21 40	0 23 14
6	0 10 47	0 10 56	0 11 13	0 11 39	0 12 11	0 12 50	0 13 34	0 14 26	0 15 29	0 16 32	0 17 44	0 19 3	0 20 31	0 22 1	0 23 37
7	0 10 48	0 10 58	0 11 15	0 11 42	0 12 15	0 12 55	0 13 40	0 14 34	0 15 39	0 16 44	0 17 58	0 19 20	0 20 50	0 22 23	0 24 2
8	0 10 50	0 11 0	0 11 18	0 11 45	0 12 19	0 13 0	0 13 47	0 14 42	0 15 49	0 16 56	0 18 12	0 19 37	0 21 10	0 22 46	0 24 29
9	0 10 51	0 11 2	0 11 21	0 11 48	0 12 23	0 13 5	0 13 54	0 14 51	0 15 59	0 17 9	0 18 27	0 19 55	0 21 30	0 23 11	0 24 58
10	0 10 53	0 11 4	0 11 24	0 11 51	0 12 27	0 13 10	0 14 1	0 15 0	0 16 9	0 17 22	0 18 43	0 20 14	0 21 51	0 23 38	0 25 30
11	0 10 54	0 11 6	0 11 27	0 11 55	0 12 31	0 13 16	0 14 9	0 15 10	0 16 19	0 17 36	0 19 0	0 20 34	0 22 15	0 24 7	0 26 4
12	0 10 55	0 11 8	0 11 30	0 11 59	0 12 36	0 13 23	0 14 18	0 15 22	0 16 30	0 17 51	0 19 19	0 20 56	0 22 42	0 24 39	0 26 41
13	0 10 57	0 11 10	0 11 33	0 12 3	0 12 42	0 13 31	0 14 28	0 15 35	0 16 43	0 18 8	0 19 40	0 21 21	0 23 12	0 25 14	0 27 21
14	0 10 58	0 11 12	0 11 36	0 12 7	0 12 48	0 13 39	0 14 39	0 15 49	0 16 59	0 18 28	0 20 4	0 21 49	0 23 45	0 25 52	0 28 5
15	0 11 0	0 11 14	0 11 39	0 12 12	0 12 55	0 13 48	0 14 51	0 16 4	0 17 18	0 18 51	0 20 31	0 22 21	0 24 22	0 26 34	0 28 54
16	0 11 1	0 11 16	0 11 42	0 12 17	0 13 2	0 13 58	0 15 4	0 16 20	0 17 39	0 19 17	0 21 2	0 22 57	0 25 3	0 27 21	0 29 48
17	0 11 3	0 11 18	0 11 45	0 12 22	0 13 9	0 14 8	0 15 18	0 16 37	0 18 2	0 19 45	0 21 36	0 23 37	0 25 48	0 28 13	0 30 47
18	0 11 4	0 11 20	0 11 48	0 12 27	0 13 17	0 14 19	0 15 33	0 16 56	0 18 28	0 20 16	0 22 13	0 24 20	0 26 38	0 29 10	0 31 52
19	0 11 6	0 11 23	0 11 51	0 12 32	0 13 26	0 14 31	0 15 50	0 17 17	0 18 57	0 20 50	0 22 53	0 25 8	0 27 33	0 30 13	0 33 4
20	0 11 7	0 11 26	0 11 54	0 12 37	0 13 36	0 14 45	0 16 9	0 17 41	0 19 29	0 21 28	0 23 38	0 26 3	0 28 36	0 31 24	0 34 24
21	0 11 8	0 11 29	0 11 59	0 12 45	0 13 48	0 15 1	0 16 31	0 18 10	0 20 4	0 22 11	0 24 30	0 27 6	0 29 49	0 32 50	0 36 1
22	0 11 9	0 11 32	0 12 6	0 12 56	0 14 3	0 15 20	0 16 57	0 18 44	0 20 45	0 23 1	0 25 31	0 28 18	0 31 2	0 34 26	0 37 50
23	0 11 11	0 11 35	0 12 15	0 13 9	0 14 21	0 15 43	0 17 29	0 19 24	0 21 33	0 23 58	0 26 41	0 29 39	0 32 47	0 36 15	0 39 54

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 38	0 10 47	0 11 1	0 11 22	0 11 47	0 12 20	0 12 58	0 13 41	0 14 31	0 15 26	0 16 27	0 17 34	0 18 46	0 20 4	0 21 28
1	0 10 37	0 10 45	0 10 58	0 11 19	0 11 43	0 12 16	0 12 53	0 13 35	0 14 24	0 15 18	0 16 18	0 17 23	0 18 33	0 19 49	0 21 11
2	0 10 36	0 10 43	0 10 55	0 11 16	0 11 39	0 12 12	0 12 48	0 13 29	0 14 17	0 15 10	0 16 9	0 17 12	0 18 20	0 19 34	0 20 54
3	0 10 34	0 10 41	0 10 52	0 11 13	0 11 36	0 12 8	0 12 43	0 13 23	0 14 10	0 15 2	0 16 0	0 17 1	0 18 8	0 19 20	0 20 38
4	0 10 32	0 10 39	0 10 50	0 11 10	0 11 33	0 12 4	0 12 38	0 13 17	0 14 3	0 14 54	0 15 51	0 16 50	0 17 56	0 19 6	0 20 22
5	0 10 30	0 10 37	0 10 48	0 11 7	0 11 30	0 12 0	0 12 33	0 13 11	0 13 56	0 14 46	0 15 42	0 16 40	0 17 44	0 18 52	0 20 6
6	0 10 28	0 10 35	0 10 46	0 11 4	0 11 27	0 11 56	0 12 28	0 13 5	0 13 49	0 14 38	0 15 33	0 16 30	0 17 32	0 18 39	0 19 51
7	0 10 26	0 10 33	0 10 44	0 11 1	0 11 24	0 11 52	0 12 23	0 13 0	0 13 42	0 14 30	0 15 24	0 16 20	0 17 20	0 18 26	0 19 36
8	0 10 24	0 10 31	0 10 42	0 10 58	0 11 21	0 11 48	0 12 19	0 12 55	0 13 36	0 14 22	0 15 15	0 16 10	0 17 9	0 18 13	0 19 22
9	0 10 22	0 10 29	0 10 40	0 10 56	0 11 18	0 11 44	0 12 15	0 12 50	0 13 30	0 14 15	0 15 6	0 16 0	0 16 58	0 18 1	0 19 9
10	0 10 20	0 10 27	0 10 38	0 10 54	0 11 15	0 11 41	0 12 11	0 12 45	0 13 24	0 14 8	0 14 57	0 15 50	0 16 47	0 17 49	0 18 56
11	0 10 18	0 10 25	0 10 36	0 10 52	0 11 12	0 11 38	0 12 7	0 12 40	0 13 18	0 14 1	0 14 49	0 15 41	0 16 37	0 17 38	0 18 44
12	0 10 16	0 10 23	0 10 34	0 10 49	0 11 9	0 11 35	0 12 3	0 12 35	0 13 12	0 13 54	0 14 41	0 15 32	0 16 27	0 17 27	0 18 32
13	0 10 14	0 10 21	0 10 32	0 10 46	0 11 6	0 11 31	0 11 59	0 12 30	0 13 6	0 13 47	0 14 33	0 15 23	0 16 17	0 17 16	0 18 20
14	0 10 12	0 10 19	0 10 30	0 10 43	0 11 3	0 11 27	0 11 55	0 12 25	0 13 0	0 13 40	0 14 25	0 15 15	0 16 8	0 17 5	0 18 8
15	0 10 10	0 10 17	0 10 27	0 10 40	0 11 0	0 11 23	0 11 51	0 12 20	0 12 54	0 13 34	0 14 18	0 15 7	0 15 59	0 16 55	0 17 56
16	0 10 8	0 10 14	0 10 24	0 10 37	0 10 57	0 11 19	0 11 47	0 12 15	0 12 48	0 13 28	0 14 11	0 14 59	0 15 50	0 16 45	0 17 44
17	0 10 5	0 10 11	0 10 21	0 10 34	0 10 54	0 11 15	0 11 42	0 12 10	0 12 43	0 13 22	0 14 4	0 14 51	0 15 41	0 16 35	0 17 33
18	0 10 2	0 10 8	0 10 18	0 10 31	0 10 50	0 11 11	0 11 37	0 12 5	0 12 38	0 13 16	0 13 57	0 14 43	0 15 32	0 16 25	0 17 22
19	0 9 59	0 10 5	0 10 15	0 10 28	0 10 46	0 11 7	0 11 32	0 12 0	0 12 33	0 13 10	0 13 50	0 14 35	0 15 23	0 16 15	0 17 11
20	0 9 56	0 10 2	0 10 12	0 10 25	0 10 42	0 11 3	0 11 27	0 11 56	0 12 28	0 13 4	0 13 43	0 14 27	0 15 14	0 16 5	0 17 0
21	0 9 53	0 9 59	0 10 9	0 10 22	0 10 38	0 10 59	0 11 22	0 11 51	0 12 22	0 12 58	0 13 36	0 14 19	0 15 5	0 15 55	0 16 49
22	0 9 50	0 9 56	0 10 6	0 10 18	0 10 34	0 10 55	0 11 17	0 11 46	0 12 16	0 12 51	0 13 29	0 14 11	0 14 56	0 15 45	0 16 38
23	0 9 47	0 9 53	0 10 2	0 10 14	0 10 30	0 10 50	0 11 13	0 11 40	0 12 10	0 12 44	0 13 22	0 14 3	0 14 47	0 15 36	0 16 27

LATITUDE 34° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 22 58	0 24 34	0 26 15	0 28 1	0 29 54	0 31 52	0 33 56	0 36 6	0 38 21	0 40 41	0 43 7	0 45 39	0 48 16	0 50 59	0 53 47
1	0 23 20	0 24 59	0 26 43	0 28 32	0 30 25	0 32 26	0 34 33	0 36 46	0 39 5	0 41 29	0 43 59	0 46 35	0 49 16	0 52 3	0 54 56
2	0 23 43	0 25 25	0 27 12	0 29 4	0 30 57	0 33 1	0 35 12	0 37 28	0 39 51	0 42 19	0 44 54	0 47 34	0 50 19	0 53 10	0 56 8
3	0 24 7	0 25 52	0 27 42	0 29 37	0 31 32	0 33 39	0 35 54	0 38 14	0 40 41	0 43 13	0 45 52	0 48 36	0 51 26	0 54 21	0 57 23
4	0 24 32	0 26 20	0 28 13	0 30 11	0 32 10	0 34 21	0 36 39	0 39 3	0 41 34	0 44 10	0 46 53	0 49 42	0 52 37	0 55 37	0 58 43
5	0 24 58	0 26 49	0 28 45	0 30 46	0 32 51	0 35 6	0 37 27	0 39 55	0 42 30	0 45 11	0 47 58	0 50 52	0 53 52	0 56 58	1 0 9
6	0 25 25	0 27 19	0 29 19	0 31 23	0 33 34	0 35 53	0 38 19	0 40 52	0 43 31	0 46 17	0 49 9	0 52 9	0 55 12	0 58 23	1 1 41
7	0 25 53	0 27 50	0 29 54	0 32 2	0 34 19	0 36 43	0 39 14	0 41 52	0 44 36	0 47 27	0 50 24	0 53 30	0 56 36	0 59 53	1 3 18
8	0 26 23	0 28 23	0 30 32	0 32 44	0 35 7	0 37 36	0 40 12	0 42 55	0 45 44	0 48 40	0 51 43	0 54 55	0 58 6	1 1 29	1 5 1
9	0 26 56	0 28 59	0 31 13	0 33 30	0 35 57	0 38 31	0 41 12	0 44 1	0 46 55	0 49 57	0 53 6	0 56 24	0 59 41	1 3 11	1 6 50
10	0 27 32	0 29 39	0 31 58	0 34 20	0 36 50	0 39 29	0 42 15	0 45 10	0 48 9	0 51 17	0 54 32	0 57 57	1 1 25	1 5 1	1 8 46
11	0 28 11	0 30 23	0 32 47	0 35 15	0 37 46	0 40 31	0 43 23	0 46 26	0 49 33	0 52 48	0 56 11	0 59 43	1 3 20	1 7 3	1 10 51
12	0 28 53	0 31 10	0 33 39	0 36 14	0 38 48	0 41 40	0 44 38	0 47 48	0 51 3	0 54 26	0 57 57	1 1 37	1 5 23	1 9 14	1 13 12
13	0 29 39	0 32 1	0 34 36	0 37 18	0 39 57	0 42 56	0 46 0	0 49 18	0 52 41	0 56 12	0 59 51	1 3 39	1 7 34	1 11 34	1 15 34
14	0 30 29	0 32 57	0 35 39	0 38 29	0 41 13	0 44 19	0 47 29	0 50 56	0 54 27	0 58 6	1 1 53	1 5 49	1 9 53	1 14 3	1 18 14
15	0 31 24	0 33 59	0 36 48	0 39 46	0 42 38	0 45 51	0 49 13	0 52 43	0 56 22	1 0 9	1 4 4	1 8 8	1 12 21	1 16 42	1 21 10
16	0 32 24	0 35 7	0 38 3	0 41 9	0 44 11	0 47 32	0 51 3	0 54 42	0 58 31	1 2 19	1 6 24	1 10 38	1 15 4	1 19 36	1 24 21
17	0 33 30	0 36 21	0 39 25	0 42 40	0 45 54	0 49 24	0 53 5	0 56 54	1 0 54	1 4 53	1 9 9	1 13 34	1 18 14	1 22 56	1 27 52
18	0 34 42	0 37 42	0 40 55	0 44 20	0 47 48	0 51 28	0 55 20	0 59 21	1 3 33	1 7 44	1 12 12	1 16 50	1 21 45	1 26 40	1 31 46
19	0 36 3	0 39 12	0 42 35	0 46 11	0 49 53	0 53 45	0 57 49	1 2 3	1 6 28	1 10 52	1 15 33	1 20 25	1 25 37	1 30 48	1 36 6
20	0 37 34	0 40 54	0 44 27	0 48 14	0 52 10	0 56 15	1 0 32	1 5 0	1 9 40	1 14 28	1 19 25	1 24 32	1 29 53	1 35 23	1 40 58
21	0 39 20	0 42 52	0 46 38	0 50 39	0 54 46	0 59 6	1 3 39	1 8 23	1 13 19	1 18 24	1 23 37	1 29 2	1 34 40	1 40 30	1 46 31
22	0 41 23	0 45 10	0 49 11	0 53 28	0 57 49	1 2 27	1 7 17	1 12 19	1 17 32	1 22 56	1 28 32	1 33 18	1 40 14	1 46 22	1 52 41
23	0 43 46	0 47 51	0 52 10	0 56 48	1 1 30	1 6 28	1 11 36	1 16 58	1 22 33	1 28 20	1 34 18	1 40 24	1 46 46	1 53 14	1 59 51

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 22 58	0 24 34	0 26 15	0 28 1	0 29 54	0 31 52	0 33 56	0 36 6	0 38 21	0 40 41	0 43 7	0 45 39	0 48 16	0 50 59	0 53 47
1	0 22 38	0 24 12	0 25 51	0 27 34	0 29 23	0 31 19	0 33 19	0 35 26	0 37 37	0 39 54	0 42 15	0 44 43	0 47 17	0 49 55	0 52 40
2	0 22 19	0 23 51	0 25 28	0 27 8	0 28 54	0 30 47	0 32 44	0 34 48	0 36 55	0 39 9	0 41 26	0 43 50	0 46 20	0 48 54	0 51 36
3	0 22 1	0 23 31	0 25 6	0 26 43	0 28 27	0 30 17	0 32 11	0 34 12	0 36 15	0 38 26	0 40 39	0 42 59	0 45 26	0 47 57	0 50 35
4	0 21 43	0 23 11	0 24 44	0 26 19	0 28 1	0 29 48	0 31 39	0 33 37	0 35 37	0 37 45	0 39 55	0 42 11	0 44 35	0 47 3	0 49 37
5	0 21 26	0 22 52	0 24 23	0 25 56	0 27 36	0 29 20	0 31 8	0 33 4	0 35 1	0 37 6	0 39 13	0 41 26	0 43 47	0 46 12	0 48 42
6	0 21 9	0 22 33	0 24 2	0 25 34	0 27 12	0 28 53	0 30 39	0 32 32	0 34 27	0 36 29	0 38 33	0 40 43	0 43 1	0 45 23	0 47 50
7	0 20 53	0 22 15	0 23 42	0 25 12	0 26 48	0 28 37	0 30 11	0 32 1	0 33 54	0 35 53	0 37 55	0 40 2	0 42 17	0 44 36	0 47 0
8	0 20 37	0 21 57	0 23 22	0 24 51	0 26 25	0 28 2	0 29 44	0 31 31	0 33 22	0 35 18	0 37 18	0 39 23	0 41 35	0 43 51	0 46 12
9	0 20 22	0 21 40	0 23 3	0 24 30	0 26 2	0 27 27	0 29 17	0 31 2	0 32 51	0 34 45	0 36 43	0 38 46	0 40 55	0 43 8	0 45 26
10	0 20 8	0 21 24	0 22 45	0 24 10	0 25 40	0 27 13	0 28 51	0 30 34	0 32 21	0 34 13	0 36 9	0 38 10	0 40 16	0 42 26	0 44 41
11	0 19 54	0 21 8	0 22 27	0 23 50	0 25 18	0 26 50	0 28 26	0 30 7	0 31 52	0 33 42	0 35 36	0 37 34	0 39 38	0 41 44	0 43 57
12	0 19 40	0 20 52	0 22 10	0 23 31	0 24 57	0 26 27	0 28 2	0 29 41	0 31 24	0 33 12	0 35 4	0 36 59	0 39 1	0 41 4	0 43 15
13	0 19 27	0 20 37	0 21 53	0 23 12	0 24 36	0 26 5	0 27 39	0 29 16	0 30 57	0 32 43	0 34 33	0 36 25	0 38 25	0 40 26	0 42 34
14	0 19 14	0 20 22	0 21 37	0 22 54	0 24 16	0 25 44	0 27 17	0 28 52	0 30 31	0 32 15	0 34 3	0 35 52	0 37 50	0 39 49	0 41 54
15	0 19 1	0 20 8	0 21 22	0 22 37	0 23 57	0 25 24	0 26 55	0 28 28	0 30 6	0 31 48	0 33 34	0 35 20	0 37 16	0 39 13	0 41 15
16	0 18 48	0 19 54	0 21 7	0 22 21	0 23 39	0 25 4	0 26 34	0 28 4	0 29 41	0 31 21	0 33 5	0 34 49	0 36 43	0 38 38	0 40 37
17	0 18 35	0 19 40	0 20 52	0 22 5	0 23 22	0 24 45	0 26 13	0 27 41	0 29 16	0 30 54	0 32 36	0 34 19	0 36 10	0 38 3	0 40 0
18	0 18 23	0 19 27	0 20 37	0 21 49	0 23 5	0 24 26	0 25 52	0 27 18	0 28 51	0 30 28	0 32 8	0 33 50	0 35 38	0 37 29	0 39 24
19	0 18 11	0 19 14	0 20 22	0 21 33	0 22 48	0 24 7	0 25 31	0 26 56	0 28 27	0 30 2	0 31 40	0 33 21	0 35 7	0 36 56	0 38 48
20	0 17 59	0 19 1	0 20 7	0 21 17	0 22 31	0 23 48	0 25 10	0 26 35	0 28 4	0 29 36	0 31 12	0 32 52	0 34 36	0 36 23	0 38 13
21	0 17 47	0 18 48	0 19 52	0 21 1	0 22 14	0 23 29	0 24 50	0 26 13	0 27 40	0 29 11	0 30 45	0 32 23	0 34 5	0 35 50	0 37 37
22	0 17 35	0 18 35	0 19 38	0 20 45	0 21 57	0 23 11	0 24 30	0 25 51	0 27 17	0 28 46	0 30 18	0 31 54	0 33 34	0 35 17	0 37 2
23	0 17 23	0 18 22	0 19 24	0 20 30	0 21 40	0 22 53	0 24 10	0 25 30	0 26 54	0 28 21	0 29 52	0 31 26	0 33 3	0 34 44	0 36 28

LATITUDE 34° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 56 41	0 59 40	1 2 44	1 5 55	1 9 10	1 12 31	1 15 56	1 19 28	1 23 5	1 26 46	1 30 33	1 34 26	1 38 22	1 42 25	1 46 33
1	0 57 54	1 0 58	1 4 7	1 7 23	1 10 43	1 14 9	1 17 39	1 21 16	1 24 58	1 28 45	1 32 37	1 36 35	1 40 37	1 44 47	1 49 0
2	0 59 11	1 2 20	1 5 34	1 8 54	1 12 19	1 15 50	1 19 26	1 23 8	1 26 56	1 30 49	1 34 47	1 38 50	1 42 59	1 47 15	1 51 34
3	1 0 31	1 3 45	1 7 4	1 10 29	1 13 59	1 17 35	1 21 17	1 25 5	1 28 59	1 32 59	1 37 3	1 41 12	1 45 27	1 49 49	1 54 15
4	1 2 1	1 5 15	1 8 40	1 12 10	1 15 45	1 19 28	1 23 16	1 27 11	1 30 11	1 35 16	1 39 26	1 43 42	1 48 4	1 52 32	1 57 5
5	1 3 37	1 6 52	1 10 22	1 13 57	1 17 39	1 21 28	1 25 23	1 29 24	1 33 30	1 37 40	1 41 57	1 46 21	1 50 50	1 55 25	2 0 6
6	1 5 13	1 8 36	1 12 12	1 15 53	1 19 41	1 23 35	1 27 36	1 31 43	1 35 55	1 40 13	1 44 38	1 49 10	1 53 45	1 58 28	2 3 17
7	1 6 54	1 10 25	1 14 8	1 17 55	1 21 49	1 25 49	1 29 57	1 34 11	1 38 30	1 42 56	1 47 29	1 52 9	1 56 51	2 1 42	2 6 39
8	1 8 41	1 12 20	1 16 10	1 20 4	1 24 5	1 28 12	1 32 27	1 36 48	1 41 15	1 45 50	1 50 31	1 55 19	2 0 10	2 5 9	2 10 14
9	1 10 35	1 14 22	1 18 19	1 22 21	1 26 30	1 30 46	1 35 9	1 39 38	1 44 14	1 48 57	1 53 46	1 58 42	2 3 42	2 8 49	2 14 3
10	1 12 36	1 16 33	1 20 37	1 24 47	1 29 5	1 33 32	1 38 4	1 42 42	1 47 27	1 52 18	1 57 15	2 2 19	2 7 29	2 12 44	2 18 6
11	1 14 50	1 18 56	1 23 9	1 27 28	1 31 54	1 36 28	1 41 9	1 45 56	1 50 50	1 55 51	2 0 58	2 6 11	2 11 31	2 16 57	2 22 30
12	1 17 17	1 21 30	1 25 50	1 30 18	1 34 54	1 39 40	1 44 28	1 49 25	1 54 29	1 59 40	2 4 56	2 10 17	2 15 48	2 21 28	2 27 12
13	1 19 49	1 24 12	1 28 45	1 33 25	1 38 12	1 43 5	1 48 4	1 53 8	1 58 21	2 3 42	2 9 11	2 14 48	2 20 31	2 26 20	2 32 14
14	1 22 40	1 27 14	1 31 55	1 36 43	1 41 59	1 46 43	1 51 55	1 57 16	2 2 42	2 8 14	2 13 53	2 19 40	2 25 33	2 31 33	2 37 40
15	1 23 46	1 30 30	1 35 23	1 40 24	1 45 31	1 50 47	1 56 11	2 1 43	2 7 21	2 13 5	2 18 57	2 24 57	2 31 3	2 37 14	2 43 34
16	1 29 9	1 34 6	1 39 11	1 44 24	1 49 49	1 55 14	2 0 50	2 6 34	2 12 24	2 18 20	2 24 26	2 30 40	2 37 0	2 43 27	2 50 1
17	1 32 53	1 38 3	1 43 21	1 48 48	1 54 22	2 0 4	2 5 53	2 11 49	2 17 55	2 24 9	2 30 29	2 36 57	2 43 31	2 50 11	2 56 59
18	1 37 1	1 42 25	1 47 58	1 53 39	1 59 27	2 5 23	2 11 28	2 17 42	2 24 2	2 30 29	2 37 5	2 43 49	2 50 39	2 57 37	3 4 40
19	1 41 38	1 47 19	1 53 7	1 59 0	2 5 4	2 11 17	2 17 40	2 24 11	2 30 48	2 37 32	2 44 25	2 51 26	2 58 43	3 5 46	3 13 6
20	1 46 47	1 52 44	1 58 48	2 5 1	2 11 23	2 17 53	2 24 33	2 31 24	2 38 19	2 45 19	2 52 31	2 59 51	3 7 15	3 14 43	3 22 23
21	1 52 35	1 58 50	2 5 14	2 11 46	2 18 28	2 25 18	2 32 18	2 39 26	2 46 40	2 54 2	3 1 32	3 9 11	3 16 56	3 24 46	3 32 46
22	1 59 11	2 5 49	2 12 33	2 19 24	2 26 26	2 33 37	2 40 59	2 48 29	2 56 5	3 3 48	3 11 38	3 19 37	3 27 42	3 35 54	3 44 15
23	2 6 38	2 13 36	2 20 44	2 28 1	2 35 28	2 43 5	2 50 50	2 58 42	3 6 40	3 14 45	3 23 0	3 31 24	3 39 53	3 48 28	3 57 10

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 56 41	0 59 40	1 2 44	1 5 55	1 9 10	1 12 31	1 15 56	1 19 28	1 23 5	1 26 46	1 30 33	1 34 26	1 38 22	1 42 25	1 46 33
1	0 55 30	0 58 25	1 1 25	1 4 32	1 7 43	1 11 0	1 14 21	1 17 48	1 21 22	1 24 56	1 28 38	1 32 27	1 36 19	1 40 14	1 44 18
2	0 54 22	0 57 14	1 0 10	1 3 13	1 6 20	1 9 33	1 12 50	1 16 12	1 19 42	1 23 10	1 26 47	1 30 31	1 34 19	1 38 8	1 42 7
3	0 53 17	0 56 6	0 58 58	1 1 57	1 5 0	1 8 9	1 11 22	1 14 39	1 18 5	1 21 27	1 24 59	1 28 38	1 32 22	1 36 6	1 40 0
4	0 52 15	0 55 1	0 57 49	1 0 44	1 3 43	1 6 48	1 9 57	1 13 9	1 16 31	1 19 48	1 23 15	1 26 49	1 30 28	1 34 8	1 37 57
5	0 51 16	0 53 59	0 56 43	0 59 34	1 2 29	1 5 36	1 8 35	1 11 42	1 15 0	1 18 13	1 21 35	1 25 4	1 28 38	1 32 14	1 35 58
6	0 50 20	0 53 0	0 55 40	0 58 27	1 1 18	1 4 15	1 7 16	1 10 19	1 13 32	1 16 41	1 19 59	1 23 23	1 26 52	1 30 24	1 34 3
7	0 49 27	0 52 3	0 54 40	0 57 23	1 0 10	1 3 3	1 6 0	1 8 59	1 12 7	1 15 13	1 18 27	1 21 46	1 25 10	1 28 38	1 32 12
8	0 48 36	0 51 8	0 53 42	0 56 21	0 59 4	1 1 53	1 4 46	1 7 42	1 10 45	1 13 48	1 16 58	1 20 13	1 23 32	1 26 56	1 30 25
9	0 47 47	0 50 15	0 52 46	0 55 21	0 58 1	1 0 46	1 3 35	1 6 28	1 9 26	1 12 26	1 15 32	1 18 43	1 21 58	1 25 18	1 28 42
10	0 47 0	0 49 24	0 51 52	0 54 23	0 57 0	0 59 41	1 2 26	1 5 16	1 8 10	1 11 7	1 14 9	1 17 16	1 20 27	1 23 43	1 27 3
11	0 46 14	0 48 35	0 51 0	0 53 27	0 56 1	0 58 38	1 1 19	1 4 6	1 6 57	1 9 51	1 12 49	1 15 52	1 18 59	1 22 11	1 25 27
12	0 45 30	0 47 48	0 50 10	0 52 33	0 55 4	0 57 37	1 0 15	1 2 59	1 5 47	1 8 37	1 11 32	1 14 31	1 17 34	1 20 42	1 23 54
13	0 44 47	0 47 2	0 49 21	0 51 41	0 54 8	0 56 38	0 59 13	1 1 54	1 4 38	1 7 25	1 10 17	1 13 13	1 16 11	1 19 15	1 22 24
14	0 44 5	0 46 17	0 48 33	0 50 50	0 53 14	0 55 41	0 58 13	1 0 51	1 3 31	1 6 15	1 9 4	1 11 57	1 14 51	1 17 51	1 20 56
15	0 43 23	0 45 33	0 47 46	0 50 1	0 52 22	0 54 46	0 57 15	0 59 50	1 2 26	1 5 7	1 7 53	1 10 43	1 13 34	1 16 30	1 19 31
16	0 42 42	0 44 50	0 47 0	0 49 13	0 51 31	0 53 52	0 56 18	0 58 50	1 1 23	1 4 1	1 6 44	1 9 31	1 12 19	1 15 12	1 18 9
17	0 42 2	0 44 8	0 46 15	0 48 26	0 50 41	0 53 0	0 55 23	0 57 52	1 0 22	1 2 57	1 5 37	1 8 21	1 11 6	1 13 56	1 16 50
18	0 41 23	0 43 27	0 45 31	0 47 40	0 49 52	0 52 9	0 54 30	0 56 56	0 59 23	1 1 55	1 4 32	1 7 13	1 9 55	1 12 42	1 15 33
19	0 40 45	0 42 46	0 44 47	0 46 54	0 49 4	0 51 19	0 53 38	0 56 1	0 58 26	1 0 55	1 3 29	1 6 7	1 8 46	1 11 30	1 14 18
20	0 40 7	0 42 5	0 44 4	0 46 8	0 48 17	0 50 30	0 52 47	0 55 7	0 57 30	0 59 56	1 2 27	1 5 2	1 7 39	1 10 20	1 13 5
21	0 39 29	0 41 25	0 43 23	0 45 25	0 47 31	0 49 42	0 51 56	0 54 14	0 56 35	0 58 58	1 1 27	1 3 59	1 6 33	1 9 11	1 11 53
22	0 38 52	0 40 46	0 42 42	0 44 42	0 46 46	0 48 55	0 51 6	0 53 22	0 55 40	0 58 1	1 0 27	1 2 56	1 5 28	1 8 3	1 10 42
23	0 38 16	0 40 7	0 42 2	0 44 0	0 46 2	0 48 8	0 50 17	0 52 30	0 54 46	0 57 5	0 59 28	1 1 54	1 4 23	1 6 56	1 9 32

LATITUDE 34° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 50 45	1 55 3	1 59 25	2 3 53	2 8 25	2 13 3	2 17 45	2 22 32	2 27 24	2 32 21	2 37 23	2 42 28	2 49 39	2 52 55	2 58 15
1	1 53 18	1 57 43	2 2 11	2 6 45	2 11 24	2 16 7	2 20 56	2 25 49	2 30 47	2 35 51	2 41 0	2 46 12	2 51 30	2 56 53	3 2 20
2	1 55 58	2 0 29	2 5 4	2 9 45	2 14 31	2 19 20	2 24 16	2 29 16	2 34 21	2 39 31	2 44 47	2 50 7	2 55 33	3 1 3	3 6 37
3	1 58 46	2 3 23	2 8 5	2 12 52	2 17 45	2 22 43	2 27 46	2 32 53	2 38 5	2 43 22	2 48 45	2 54 13	2 59 47	3 5 24	3 11 5
4	2 1 44	2 6 28	2 11 17	2 16 12	2 21 13	2 26 17	2 31 27	2 36 42	2 42 2	2 47 28	2 52 58	2 58 33	3 4 15	3 10 0	3 15 48
5	2 4 52	2 9 43	2 14 38	2 19 41	2 24 50	2 30 3	2 35 21	2 40 44	2 46 13	2 51 47	2 57 25	3 3 8	3 8 57	3 14 50	3 20 47
6	2 8 11	2 13 10	2 18 14	2 23 25	2 28 42	2 34 2	2 39 28	2 45 0	2 50 37	2 56 20	3 2 7	3 7 59	3 13 55	3 19 58	3 26 4
7	2 11 41	2 16 49	2 22 2	2 27 21	2 32 46	2 38 14	2 43 48	2 49 29	2 55 14	3 1 6	3 7 2	3 12 3	3 19 7	3 25 20	3 31 38
8	2 15 24	2 20 40	2 26 2	2 31 29	2 37 2	2 42 40	2 48 24	2 54 15	3 0 8	3 6 9	3 12 14	3 18 25	3 24 37	3 31 1	3 37 31
9	2 19 22	2 24 47	2 30 17	2 35 54	2 41 37	2 47 25	2 53 19	2 59 18	3 5 21	3 11 31	3 17 47	3 24 8	3 30 29	3 37 1	3 43 39
10	2 23 36	2 29 11	2 34 51	2 40 38	2 46 31	2 52 29	2 58 33	3 4 41	3 10 54	3 17 14	3 23 41	3 30 12	3 36 46	3 43 27	3 50 16
11	2 28 9	2 33 54	2 39 44	2 45 41	2 51 44	2 57 53	3 4 7	3 10 27	3 16 53	3 23 24	3 30 1	3 36 43	3 43 29	3 50 21	3 57 20
12	2 33 0	2 38 56	2 44 58	2 51 6	2 57 21	3 3 40	3 10 4	3 16 36	3 23 16	3 30 0	3 36 49	3 43 42	3 50 39	3 57 42	4 4 52
13	2 38 13	2 44 20	2 50 34	2 56 53	3 3 18	3 9 50	3 16 30	3 23 14	3 30 2	3 36 56	3 43 56	3 51 2	3 58 13	4 5 29	4 12 49
14	2 43 53	2 50 12	2 56 38	3 3 11	3 9 50	3 16 34	3 23 23	3 30 19	3 37 21	3 44 29	3 51 42	3 59 0	4 6 22	4 13 51	4 21 23
15	2 50 2	2 56 35	3 3 13	3 9 57	3 16 50	3 23 48	3 30 50	3 37 59	3 45 16	3 52 37	4 0 3	4 7 35	4 15 13	4 22 53	4 30 37
16	2 56 41	3 3 27	3 10 20	3 17 19	3 24 25	3 31 37	3 38 54	3 46 17	3 53 47	4 1 22	4 9 3	4 16 50	4 24 41	4 32 37	4 40 34
17	3 3 55	3 10 57	3 18 4	3 25 18	3 32 40	3 40 7	3 47 40	3 55 18	4 3 2	4 10 52	4 18 47	4 26 49	4 34 57	4 43 8	4 51 21
18	3 11 48	3 19 6	3 26 32	3 34 4	3 41 41	3 49 24	3 57 12	4 5 6	4 13 7	4 21 13	4 29 24	4 37 42	4 46 6	4 54 32	5 3 0
19	3 20 34	3 28 8	3 35 48	3 43 37	3 51 34	3 59 34	4 7 38	4 15 49	4 24 6	4 32 28	4 40 55	4 49 28	4 58 8	5 6 52	5 15 41
20	3 30 13	3 38 6	3 46 2	3 54 18	4 2 23	4 10 41	4 19 3	4 27 32	4 36 8	4 44 49	4 53 35	5 2 25	5 11 20	5 20 19	5 29 23
21	3 40 53	3 49 6	3 57 23	4 5 48	4 14 18	4 22 55	4 31 39	4 40 28	4 49 21	4 58 18	5 7 23	5 16 31	5 25 43	5 35 3	5 44 31
22	3 52 44	4 0 18	4 9 56	4 18 41	4 27 32	4 36 29	4 45 33	4 54 42	5 3 55	5 13 13	5 22 36	5 32 4	5 41 38	5 51 15	6 0 55
23	4 6 0	4 14 54	4 23 53	4 33 0	4 42 14	4 51 33	5 0 58	5 10 26	5 19 58	5 29 37	5 39 22	5 49 10	5 59 2	6 8 56	6 18 52

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 50 45	1 55 3	1 59 25	2 3 53	2 8 25	2 13 3	2 17 45	2 22 32	2 27 24	2 32 21	2 37 23	2 42 28	2 47 39	2 52 55	2 58 15
1	1 48 23	1 52 36	1 56 53	2 1 16	2 5 42	2 10 15	2 14 52	2 19 33	2 24 19	2 29 11	2 34 5	2 39 2	2 44 7	2 49 15	2 54 29
2	1 46 6	1 50 14	1 54 26	1 58 43	2 3 4	2 7 31	2 12 3	2 16 38	2 21 18	2 26 4	2 30 52	2 35 42	2 40 41	2 45 42	2 50 50
3	1 43 53	1 47 56	1 52 3	1 56 15	2 0 31	2 4 52	2 9 19	2 13 48	2 18 22	2 23 2	2 27 44	2 32 28	2 37 21	2 42 16	2 47 18
4	1 41 45	1 45 43	1 49 45	1 53 52	1 58 3	2 2 18	2 6 40	2 11 3	2 15 31	2 20 5	2 24 41	2 29 20	2 34 7	2 38 56	2 43 52
5	1 39 42	1 43 35	1 47 32	1 51 34	1 55 40	1 59 49	2 4 6	2 8 23	2 12 45	2 17 13	2 21 43	2 26 17	2 30 58	2 35 41	2 40 31
6	1 37 43	1 41 31	1 45 23	1 49 20	1 53 21	1 57 25	2 1 36	2 5 48	2 10 4	2 14 26	2 18 51	2 23 20	2 27 55	2 32 32	2 37 16
7	1 35 48	1 39 31	1 43 18	1 47 10	1 51 6	1 55 5	1 59 10	2 3 17	2 7 28	2 11 44	2 16 4	2 20 28	2 24 57	2 29 29	2 34 7
8	1 33 57	1 37 35	1 41 17	1 45 4	1 48 55	1 52 49	1 56 48	2 0 50	2 4 56	2 9 7	2 13 22	2 17 41	2 22 5	2 26 32	2 31 4
9	1 32 10	1 35 43	1 39 20	1 43 2	1 46 48	1 50 37	1 54 30	1 58 27	2 2 28	2 6 34	2 10 44	2 14 58	2 19 17	2 23 39	2 28 5
10	1 30 27	1 33 55	1 37 27	1 41 4	1 44 45	1 48 29	1 52 17	1 56 9	2 0 5	2 4 6	2 8 11	2 12 20	2 16 34	2 20 51	2 25 11
11	1 28 46	1 32 10	1 35 38	1 39 10	1 42 46	1 46 25	1 50 8	1 53 55	1 57 47	2 1 43	2 5 44	2 9 48	2 13 57	2 18 8	2 22 22
12	1 27 9	1 30 29	1 33 53	1 37 20	1 40 51	1 44 26	1 48 4	1 51 46	1 55 34	1 59 25	2 3 22	2 7 21	2 11 25	2 15 31	2 19 40
13	1 25 35	1 28 51	1 32 11	1 35 34	1 39 0	1 42 31	1 46 4	1 49 42	1 53 25	1 57 12	2 1 5	2 5 0	2 8 59	2 13 0	2 17 5
14	1 24 4	1 27 16	1 30 32	1 33 52	1 37 14	1 40 40	1 44 9	1 47 43	1 51 22	1 55 4	1 58 53	2 2 44	2 6 38	2 10 35	2 14 36
15	1 22 36	1 25 44	1 28 56	1 32 13	1 35 31	1 38 53	1 42 18	1 45 49	1 49 24	1 53 1	1 56 46	2 0 33	2 4 22	2 8 15	2 12 12
16	1 21 11	1 24 15	1 27 23	1 30 37	1 33 52	1 37 10	1 40 32	1 43 59	1 47 30	1 51 3	1 54 44	1 58 27	2 2 12	2 6 1	2 9 54
17	1 19 49	1 22 50	1 25 54	1 29 4	1 32 16	1 35 31	1 38 50	1 42 13	1 45 40	1 49 10	1 52 47	1 56 26	2 0 7	2 3 52	2 7 41
18	1 18 29	1 20 27	1 24 28	1 27 34	1 30 43	1 33 55	1 37 11	1 40 31	1 43 54	1 47 21	1 50 54	1 54 29	1 58 6	2 1 47	2 5 32
19	1 17 11	1 19 6	1 23 4	1 26 7	1 29 13	1 32 22	1 35 35	1 38 52	1 42 11	1 45 35	1 49 4	1 52 35	1 56 8	1 59 45	2 3 26
20	1 15 55	1 18 47	1 21 42	1 24 42	1 27 45	1 30 51	1 34 1	1 37 14	1 40 31	1 43 51	1 47 16	1 50 43	1 54 12	1 57 45	2 1 22
21	1 14 40	1 17 29	1 20 21	1 23 18	1 26 17	1 29 20	1 32 27	1 35 37	1 38 50	1 42 7	1 45 28	1 48 51	1 52 17	1 55 46	1 59 19
22	1 13 26	1 16 12	1 19 1	1 21 54	1 24 50	1 27 50	1 30 54	1 34 0	1 37 10	1 40 23	1 43 40	1 46 59	1 50 23	1 53 48	1 57 17
23	1 12 12	1 14 55	1 17 41	1 20 31	1 23 24	1 26 21	1 29 21	1 32 24	1 35 30	1 38 40	1 41 53	1 45 9	1 48 29	1 51 51	1 55 16

LATITUDE 35° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 39	0 10 47	0 11 1	0 11 20	0 11 45	0 12 17	0 12 53	0 13 35	0 14 23	0 15 16	0 16 14	0 17 19	0 18 29	0 19 44	0 21 5
1	0 10 40	0 10 48	0 11 3	0 11 22	0 11 48	0 12 21	0 12 58	0 13 41	0 14 30	0 15 23	0 16 22	0 17 29	0 18 41	0 19 58	0 21 21
2	0 10 41	0 10 49	0 11 5	0 11 24	0 11 51	0 12 25	0 13 3	0 13 47	0 14 37	0 15 31	0 16 31	0 17 40	0 18 54	0 20 13	0 21 38
3	0 10 43	0 10 50	0 11 7	0 11 26	0 11 54	0 12 29	0 13 8	0 13 53	0 14 44	0 15 39	0 16 41	0 17 52	0 19 8	0 20 29	0 21 56
4	0 10 44	0 10 51	0 11 9	0 11 28	0 11 57	0 12 33	0 13 13	0 13 59	0 14 52	0 15 48	0 16 52	0 18 5	0 19 23	0 20 46	0 22 15
5	0 10 45	0 10 53	0 11 11	0 11 31	0 12 1	0 12 38	0 13 19	0 14 6	0 15 0	0 15 58	0 17 4	0 18 19	0 19 39	0 21 4	0 22 35
6	0 10 47	0 10 55	0 11 13	0 11 34	0 12 5	0 12 43	0 13 25	0 14 13	0 15 9	0 16 9	0 17 17	0 18 34	0 19 56	0 21 24	0 22 57
7	0 10 48	0 10 57	0 11 15	0 11 37	0 12 9	0 12 48	0 13 31	0 14 20	0 15 18	0 16 21	0 17 31	0 18 50	0 20 14	0 21 45	0 23 21
8	0 10 49	0 10 59	0 11 17	0 11 40	0 12 13	0 12 53	0 13 37	0 14 28	0 15 28	0 16 34	0 17 46	0 19 7	0 20 34	0 22 8	0 23 47
9	0 10 51	0 11 1	0 11 19	0 11 43	0 12 17	0 12 58	0 13 44	0 14 36	0 15 39	0 16 48	0 18 2	0 19 25	0 20 55	0 22 33	0 24 15
10	0 10 52	0 11 3	0 11 21	0 11 46	0 12 21	0 13 3	0 13 51	0 14 45	0 15 51	0 17 3	0 18 19	0 19 44	0 21 18	0 23 0	0 24 46
11	0 10 53	0 11 5	0 11 23	0 11 50	0 12 26	0 13 8	0 13 58	0 14 55	0 16 4	0 17 18	0 18 37	0 20 5	0 21 42	0 23 27	0 25 17
12	0 10 55	0 11 7	0 11 26	0 11 54	0 12 31	0 13 14	0 14 5	0 15 6	0 16 17	0 17 34	0 18 56	0 20 27	0 22 8	0 23 56	0 25 50
13	0 10 56	0 11 9	0 11 29	0 11 58	0 12 37	0 13 20	0 14 14	0 15 17	0 16 31	0 17 51	0 19 17	0 20 51	0 22 36	0 24 27	0 26 26
14	0 10 58	0 11 11	0 11 32	0 12 2	0 12 43	0 13 27	0 14 23	0 15 29	0 16 46	0 18 9	0 19 39	0 21 17	0 23 6	0 25 1	0 27 5
15	0 10 59	0 11 13	0 11 35	0 12 6	0 12 49	0 13 35	0 14 33	0 15 42	0 17 2	0 18 28	0 20 3	0 21 45	0 23 39	0 25 38	0 27 48
16	0 11 1	0 11 15	0 11 38	0 12 11	0 12 56	0 13 44	0 14 44	0 15 56	0 17 19	0 18 50	0 20 30	0 22 16	0 24 15	0 26 19	0 28 35
17	0 11 2	0 11 17	0 11 41	0 12 15	0 13 3	0 13 54	0 14 56	0 16 12	0 17 38	0 19 14	0 20 59	0 22 50	0 24 54	0 27 4	0 29 27
18	0 11 4	0 11 19	0 11 44	0 12 21	0 13 11	0 14 5	0 15 10	0 16 30	0 17 59	0 19 40	0 21 3	0 23 27	0 25 37	0 27 54	0 30 24
19	0 11 5	0 11 21	0 11 47	0 12 26	0 13 19	0 14 17	0 15 26	0 16 50	0 18 22	0 20 9	0 22 4	0 24 7	0 26 24	0 28 49	0 31 27
20	0 11 6	0 11 23	0 11 50	0 12 31	0 13 27	0 14 30	0 15 44	0 17 12	0 18 48	0 20 41	0 22 42	0 24 53	0 27 18	0 29 51	0 32 37
21	0 11 7	0 11 25	0 11 54	0 12 37	0 13 36	0 14 44	0 16 3	0 17 36	0 19 18	0 21 17	0 23 26	0 25 45	0 28 19	0 31 1	0 33 57
22	0 11 8	0 11 27	0 11 59	0 12 44	0 13 46	0 15 0	0 16 24	0 18 3	0 19 53	0 21 59	0 24 17	0 26 44	0 29 28	0 32 22	0 35 29
23	0 11 9	0 11 30	0 12 5	0 12 52	0 13 58	0 15 17	0 16 47	0 18 34	0 20 33	0 22 47	0 25 15	0 27 52	0 30 47	0 33 54	0 37 15

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 39	0 10 47	0 11 1	0 11 20	0 11 45	0 12 17	0 12 53	0 13 35	0 14 23	0 15 16	0 16 14	0 17 19	0 18 29	0 19 44	0 21 5
1	0 10 37	0 10 44	0 10 59	0 11 18	0 11 41	0 12 13	0 12 48	0 13 29	0 14 16	0 15 8	0 16 5	0 17 9	0 18 17	0 19 30	0 20 49
2	0 10 35	0 10 41	0 10 57	0 11 16	0 11 37	0 12 9	0 12 43	0 13 23	0 14 9	0 15 0	0 15 56	0 16 59	0 18 5	0 19 16	0 20 33
3	0 10 33	0 10 39	0 10 55	0 11 13	0 11 33	0 12 5	0 12 38	0 13 17	0 14 2	0 14 52	0 15 47	0 16 49	0 17 53	0 19 3	0 20 18
4	0 10 31	0 10 37	0 10 53	0 11 10	0 11 30	0 12 1	0 12 33	0 13 11	0 13 55	0 14 44	0 15 38	0 16 39	0 17 41	0 18 50	0 20 3
5	0 10 29	0 10 35	0 10 51	0 11 7	0 11 27	0 11 57	0 12 28	0 13 5	0 13 48	0 14 36	0 15 29	0 16 29	0 17 30	0 18 37	0 19 48
6	0 10 27	0 10 33	0 10 49	0 11 4	0 11 24	0 11 53	0 12 23	0 13 0	0 13 42	0 14 28	0 15 20	0 16 19	0 17 19	0 18 24	0 19 34
7	0 10 25	0 10 31	0 10 46	0 11 1	0 11 21	0 11 49	0 12 18	0 12 55	0 13 36	0 14 21	0 15 11	0 16 9	0 17 8	0 18 11	0 19 20
8	0 10 23	0 10 29	0 10 43	0 10 58	0 11 18	0 11 45	0 12 14	0 12 50	0 13 30	0 14 14	0 15 3	0 15 59	0 16 57	0 17 59	0 19 6
9	0 10 21	0 10 27	0 10 40	0 10 55	0 11 15	0 11 41	0 12 10	0 12 45	0 13 24	0 14 7	0 14 55	0 15 49	0 16 46	0 17 47	0 18 53
10	0 10 19	0 10 25	0 10 37	0 10 52	0 11 12	0 11 37	0 12 6	0 12 40	0 13 18	0 14 0	0 14 47	0 15 39	0 16 35	0 17 35	0 18 40
11	0 10 17	0 10 23	0 10 34	0 10 49	0 11 9	0 11 33	0 12 2	0 12 35	0 13 12	0 13 53	0 14 39	0 15 30	0 16 25	0 17 24	0 18 28
12	0 10 15	0 10 21	0 10 31	0 10 46	0 11 6	0 11 29	0 11 58	0 12 30	0 13 6	0 13 46	0 14 31	0 15 21	0 16 15	0 17 13	0 18 16
13	0 10 13	0 10 19	0 10 28	0 10 43	0 11 3	0 11 25	0 11 54	0 12 25	0 13 0	0 13 39	0 14 23	0 15 12	0 16 5	0 17 2	0 18 4
14	0 10 10	0 10 16	0 10 25	0 10 40	0 11 0	0 11 21	0 11 50	0 12 20	0 12 54	0 13 32	0 14 16	0 15 4	0 15 56	0 16 52	0 17 52
15	0 10 7	0 10 13	0 10 22	0 10 37	0 10 57	0 11 17	0 11 46	0 12 15	0 12 48	0 13 25	0 14 9	0 14 56	0 15 47	0 16 42	0 17 40
16	0 10 4	0 10 10	0 10 19	0 10 34	0 10 53	0 11 13	0 11 41	0 12 10	0 12 42	0 13 19	0 14 2	0 14 48	0 15 38	0 16 32	0 17 29
17	0 10 1	0 10 7	0 10 16	0 10 31	0 10 49	0 11 9	0 11 36	0 12 5	0 12 36	0 13 13	0 13 55	0 14 40	0 15 29	0 16 22	0 17 18
18	0 9 58	0 10 4	0 10 13	0 10 28	0 10 45	0 11 5	0 11 31	0 12 0	0 12 30	0 13 7	0 13 48	0 14 32	0 15 20	0 16 12	0 17 7
19	0 9 55	0 10 1	0 10 10	0 10 24	0 10 41	0 11 1	0 11 26	0 11 55	0 12 25	0 13 1	0 13 41	0 14 24	0 15 11	0 16 2	0 16 56
20	0 9 52	0 9 58	0 10 7	0 10 20	0 10 37	0 10 57	0 11 21	0 11 49	0 12 20	0 12 55	0 13 34	0 14 16	0 15 2	0 15 52	0 16 45
21	0 9 49	0 9 54	0 10 3	0 10 16	0 10 33	0 10 52	0 11 16	0 11 43	0 12 14	0 12 48	0 13 27	0 14 8	0 14 53	0 15 42	0 16 34
22	0 9 45	0 9 50	0 9 59	0 10 12	0 10 28	0 10 47	0 11 11	0 11 37	0 12 8	0 12 41	0 13 19	0 14 0	0 14 44	0 15 32	0 16 23
23	0 9 41	0 9 46	0 9 55	0 10 7	0 10 23	0 10 42	0 11 5	0 11 31	0 12 1	0 12 34	0 13 11	0 13 51	0 14 34	0 15 22	0 16 12

LATITUDE 35° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 22 32	0 24 4	0 25 41	0 27 23	0 29 13	0 31 7	0 33 5	0 35 11	0 37 21	0 39 36	0 41 57	0 44 23	0 46 54	0 49 32	0 52 14
1	0 22 50	0 24 25	0 26 5	0 27 49	0 29 42	0 31 39	0 33 40	0 35 51	0 38 5	0 40 24	0 42 49	0 45 19	0 47 54	0 50 37	0 53 18
2	0 23 9	0 24 48	0 26 30	0 28 16	0 30 13	0 32 14	0 34 18	0 36 33	0 38 51	0 41 14	0 43 43	0 46 17	0 48 56	0 51 44	0 54 26
3	0 23 30	0 25 12	0 26 56	0 28 46	0 30 46	0 32 51	0 34 58	0 37 17	0 39 39	0 42 6	0 44 39	0 47 17	0 50 0	0 52 53	0 55 37
4	0 23 52	0 25 37	0 27 24	0 29 18	0 31 21	0 33 30	0 35 40	0 38 3	0 40 29	0 43 0	0 45 37	0 48 19	0 51 7	0 54 5	0 56 51
5	0 24 15	0 26 3	0 27 54	0 29 52	0 31 58	0 34 11	0 36 25	0 38 52	0 41 22	0 43 56	0 46 37	0 49 24	0 52 17	0 55 20	0 58 8
6	0 24 40	0 26 31	0 28 26	0 30 28	0 32 37	0 34 54	0 37 12	0 39 43	0 42 17	0 44 55	0 47 40	0 50 32	0 53 30	0 56 38	0 59 30
7	0 25 7	0 27 1	0 29 0	0 31 6	0 33 18	0 35 39	0 38 1	0 40 36	0 43 14	0 45 57	0 49 47	0 51 44	0 54 47	0 58 0	1 0 58
8	0 25 36	0 27 33	0 29 36	0 31 46	0 34 1	0 36 26	0 38 52	0 41 31	0 44 14	0 47 2	0 49 57	0 52 59	0 56 7	0 59 25	1 2 32
9	0 26 7	0 28 7	0 30 14	0 32 28	0 34 46	0 37 15	0 39 46	0 42 29	0 45 16	0 48 10	0 51 10	0 54 18	0 57 31	1 0 54	1 4 12
10	0 26 41	0 28 43	0 30 55	0 33 12	0 35 33	0 38 6	0 40 43	0 43 30	0 46 21	0 49 21	0 52 26	0 55 41	0 58 59	1 2 27	1 5 59
11	0 27 16	0 29 22	0 31 38	0 34 0	0 36 25	0 39 2	0 41 45	0 44 38	0 47 35	0 50 42	0 53 54	0 57 15	1 0 40	1 4 15	1 7 54
12	0 27 54	0 30 4	0 32 24	0 34 52	0 37 22	0 40 4	0 42 53	0 45 52	0 48 56	0 52 10	0 55 29	0 58 57	1 2 30	1 6 12	1 9 57
13	0 28 35	0 30 49	0 33 14	0 35 48	0 38 25	0 41 12	0 44 8	0 47 14	0 50 24	0 53 45	0 57 12	1 0 47	1 4 28	1 8 18	1 12 9
14	0 29 20	0 31 39	0 34 9	0 36 49	0 39 34	0 42 27	0 45 30	0 48 43	0 52 0	0 55 28	0 59 3	1 2 45	1 6 35	1 10 33	1 14 33
15	0 30 9	0 32 33	0 35 9	0 37 56	0 40 49	0 43 49	0 47 0	0 50 20	0 53 44	0 57 20	1 1 3	1 4 52	1 8 52	1 12 58	1 17 11
16	0 31 2	0 33 32	0 36 15	0 39 9	0 42 11	0 45 20	0 48 39	0 52 7	0 55 40	0 59 25	1 3 17	1 7 16	1 11 24	1 15 40	1 20 1
17	0 32 0	0 34 37	0 37 27	0 40 29	0 43 41	0 46 59	0 50 27	0 54 4	0 57 47	1 1 42	1 5 43	1 9 53	1 14 10	1 18 37	1 23 8
18	0 33 4	0 35 50	0 38 48	0 41 58	0 45 20	0 48 47	0 52 25	0 56 12	1 0 6	1 4 12	1 8 23	1 12 45	1 17 14	1 21 53	1 26 34
19	0 34 15	0 37 11	0 40 18	0 43 38	0 47 8	0 50 45	0 54 34	0 58 32	1 2 38	1 6 56	1 11 18	1 15 53	1 20 36	1 25 28	1 30 24
20	0 35 34	0 38 41	0 41 58	0 45 28	0 49 7	0 52 55	0 56 54	1 1 6	1 5 26	1 9 56	1 14 30	1 19 19	1 24 18	1 29 25	1 34 39
21	0 37 4	0 40 23	0 43 51	0 47 33	0 51 21	0 55 24	0 59 35	1 3 59	1 8 34	1 13 17	1 18 6	1 23 9	1 28 23	1 33 44	1 39 23
22	0 38 47	0 42 19	0 46 0	0 49 56	0 53 55	0 58 15	1 2 43	1 7 21	1 12 13	1 17 11	1 22 18	1 27 38	1 33 9	1 38 47	1 44 46
23	0 40 47	0 44 33	0 48 29	0 52 41	0 56 54	1 1 34	1 6 21	1 11 15	1 16 25	1 21 42	1 27 12	1 32 52	1 38 43	1 44 43	1 50 52

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 22 32	0 24 4	0 25 41	0 27 23	0 29 13	0 31 7	0 33 5	0 35 11	0 37 21	0 39 36	0 41 57	0 44 23	0 46 54	0 49 32	0 52 14
1	0 22 14	0 23 43	0 25 18	0 26 59	0 28 46	0 30 37	0 32 32	0 34 35	0 36 42	0 38 53	0 41 9	0 43 33	0 46 0	0 48 34	0 51 12
2	0 21 57	0 23 23	0 24 56	0 26 35	0 28 20	0 30 8	0 32 0	0 34 0	0 36 4	0 38 11	0 40 23	0 42 44	0 45 8	0 47 38	0 50 13
3	0 21 40	0 23 4	0 24 35	0 26 12	0 27 54	0 29 40	0 31 29	0 33 26	0 35 27	0 37 31	0 39 39	0 41 57	0 44 18	0 46 44	0 49 16
4	0 21 23	0 22 45	0 24 14	0 25 49	0 27 29	0 29 12	0 30 59	0 32 53	0 34 51	0 36 52	0 38 57	0 41 12	0 43 30	0 45 53	0 48 22
5	0 21 6	0 22 27	0 23 54	0 25 27	0 27 4	0 28 45	0 30 30	0 32 21	0 34 16	0 36 14	0 38 17	0 40 29	0 42 44	0 45 4	0 47 30
6	0 20 50	0 22 9	0 23 34	0 25 5	0 26 40	0 28 19	0 30 2	0 31 50	0 33 42	0 35 38	0 37 39	0 39 48	0 42 0	0 41 17	0 46 40
7	0 20 34	0 21 52	0 23 15	0 24 44	0 26 16	0 27 53	0 29 34	0 31 20	0 33 10	0 35 4	0 37 3	0 39 9	0 41 18	0 43 32	0 45 52
8	0 20 18	0 21 35	0 22 56	0 24 23	0 25 53	0 27 28	0 29 7	0 30 51	0 32 39	0 34 31	0 36 28	0 38 32	0 40 38	0 42 49	0 45 6
9	0 20 3	0 21 19	0 22 38	0 24 3	0 25 31	0 27 4	0 28 41	0 30 23	0 32 9	0 33 59	0 35 54	0 37 56	0 40 0	0 42 8	0 44 22
10	0 19 49	0 21 3	0 22 21	0 23 44	0 25 10	0 26 41	0 28 16	0 29 56	0 31 40	0 33 28	0 35 21	0 37 21	0 39 23	0 41 29	0 43 40
11	0 19 36	0 20 49	0 22 5	0 23 26	0 24 50	0 26 19	0 27 52	0 29 30	0 31 12	0 32 58	0 34 49	0 36 47	0 38 47	0 40 51	0 42 59
12	0 19 23	0 20 35	0 21 49	0 23 8	0 24 30	0 25 58	0 27 29	0 29 5	0 30 45	0 32 29	0 34 18	0 36 14	0 38 12	0 40 14	0 42 19
13	0 19 10	0 20 21	0 21 33	0 22 51	0 24 11	0 25 38	0 27 7	0 28 41	0 30 19	0 32 1	0 33 48	0 35 42	0 37 38	0 39 37	0 41 40
14	0 18 57	0 20 7	0 21 18	0 22 34	0 23 52	0 25 18	0 26 45	0 28 18	0 29 54	0 31 34	0 33 19	0 35 11	0 37 4	0 39 1	0 41 1
15	0 18 44	0 19 53	0 21 3	0 22 17	0 23 34	0 24 59	0 26 24	0 27 56	0 29 30	0 31 8	0 32 51	0 34 40	0 36 31	0 38 25	0 40 23
16	0 18 31	0 19 39	0 20 48	0 22 0	0 23 16	0 24 40	0 26 3	0 27 34	0 29 6	0 30 42	0 32 24	0 34 10	0 35 58	0 37 50	0 39 46
17	0 18 19	0 19 25	0 20 33	0 21 44	0 22 58	0 24 21	0 25 43	0 27 12	0 28 42	0 30 17	0 31 57	0 33 40	0 35 26	0 37 16	0 39 10
18	0 18 7	0 19 11	0 20 18	0 21 28	0 22 41	0 24 2	0 25 23	0 26 50	0 28 18	0 29 52	0 31 30	0 33 11	0 34 54	0 36 42	0 38 34
19	0 17 55	0 18 57	0 20 3	0 21 12	0 22 24	0 23 43	0 25 3	0 26 28	0 27 55	0 29 27	0 31 3	0 32 42	0 34 23	0 36 9	0 37 59
20	0 17 43	0 18 43	0 19 48	0 20 56	0 22 8	0 23 24	0 24 43	0 26 6	0 27 32	0 29 2	0 30 36	0 32 13	0 33 53	0 35 37	0 37 25
21	0 17 31	0 18 30	0 19 33	0 20 40	0 21 51	0 23 5	0 24 23	0 25 44	0 27 9	0 28 38	0 30 10	0 31 45	0 33 24	0 35 6	0 36 52
22	0 17 19	0 18 17	0 19 19	0 20 24	0 21 34	0 22 47	0 24 3	0 25 23	0 26 46	0 28 14	0 29 44	0 31 18	0 32 55	0 34 36	0 36 20
23	0 17 6	0 18 4	0 19 5	0 20 9	0 21 17	0 22 29	0 23 44	0 25 2	0 26 24	0 27 50	0 29 18	0 30 51	0 32 27	0 34 6	0 35 48

LATITUDE 35° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 55 2	0 57 54	1 0 53	1 3 56	1 7 4	1 10 18	1 13 36	1 17 1	1 20 30	1 24 4	1 27 43	1 31 27	1 35 16	1 39 10	1 43 10
1	0 56 10	0 59 7	1 2 10	1 5 17	1 8 30	1 11 49	1 15 12	1 18 42	1 22 16	1 25 55	1 29 39	1 33 28	1 37 23	1 41 23	1 45 28
2	0 57 21	1 0 23	1 3 30	1 6 41	1 9 59	1 13 24	1 16 52	1 20 27	1 24 6	1 27 50	1 31 40	1 35 35	1 39 36	1 43 42	1 47 53
3	0 58 36	1 1 43	1 4 54	1 8 10	1 11 33	1 15 3	1 18 37	1 22 17	1 26 2	1 29 51	1 33 47	1 37 48	1 41 55	1 46 7	1 50 24
4	0 59 55	1 3 7	1 6 23	1 9 44	1 13 12	1 16 47	1 20 27	1 24 12	1 28 3	1 31 58	1 36 0	1 40 7	1 44 20	1 48 38	1 53 1
5	1 1 18	1 4 35	1 7 57	1 11 23	1 14 56	1 18 36	1 22 22	1 26 13	1 30 10	1 34 12	1 38 19	1 42 32	1 46 51	1 51 15	1 55 44
6	1 2 46	1 6 8	1 9 36	1 13 8	1 16 47	1 20 33	1 24 25	1 28 22	1 32 25	1 36 34	1 40 48	1 45 7	1 49 33	1 54 3	1 58 39
7	1 4 20	1 7 48	1 11 21	1 15 0	1 18 45	1 22 37	1 26 35	1 30 39	1 34 49	1 39 4	1 43 25	1 47 51	1 52 24	1 57 2	2 1 45
8	1 6 0	1 9 34	1 13 14	1 16 59	1 20 51	1 24 49	1 28 53	1 33 4	1 37 21	1 41 43	1 46 11	1 50 46	1 55 26	2 0 13	2 5 5
9	1 7 46	1 11 26	1 15 13	1 19 5	1 23 5	1 27 10	1 31 21	1 35 39	1 40 3	1 44 33	1 49 9	1 53 52	1 58 40	2 3 35	2 8 35
10	1 9 39	1 13 26	1 17 19	1 21 18	1 25 25	1 29 39	1 33 58	1 38 24	1 42 56	1 47 34	1 52 19	1 57 10	2 2 7	2 7 10	2 12 18
11	1 11 41	1 15 35	1 19 36	1 23 43	1 27 58	1 32 20	1 36 48	1 41 22	1 46 3	1 50 50	1 55 44	2 0 44	2 5 50	2 11 2	2 16 20
12	1 13 52	1 17 55	1 22 4	1 26 19	1 30 42	1 35 12	1 39 49	1 44 32	1 49 22	1 54 18	1 59 21	2 4 31	2 9 46	2 15 7	2 20 35
13	1 16 14	1 20 26	1 24 43	1 29 7	1 33 39	1 38 17	1 43 3	1 47 56	1 52 55	1 58 1	2 3 14	2 8 34	2 13 59	2 19 29	2 25 7
14	1 18 47	1 23 8	1 27 35	1 32 8	1 36 49	1 41 38	1 46 33	1 51 35	1 56 45	2 2 3	2 7 27	2 12 56	2 18 32	2 24 15	2 30 5
15	1 21 34	1 26 4	1 30 41	0 35 25	1 40 17	1 45 16	1 50 23	1 55 37	2 0 58	2 6 25	2 11 59	2 17 40	2 23 28	2 29 23	2 35 25
16	1 24 35	1 29 16	1 34 3	1 38 57	1 44 0	1 49 12	1 54 30	1 59 56	2 5 28	2 11 7	2 16 54	2 22 48	2 28 48	2 34 55	2 41 9
17	1 27 52	1 32 45	1 37 44	1 42 51	1 48 7	1 53 31	1 59 2	2 4 40	2 10 24	2 16 15	2 22 16	2 28 25	2 34 39	2 40 59	2 47 26
18	1 31 32	1 36 37	1 41 50	1 47 9	1 52 38	1 58 16	2 4 1	2 9 52	2 15 51	2 21 57	2 28 12	2 34 35	2 41 3	2 47 36	2 54 18
19	1 35 33	1 40 51	1 46 18	1 51 53	1 57 37	2 3 29	2 9 29	2 15 35	2 21 49	2 28 12	2 34 42	2 41 19	2 48 3	2 54 53	3 1 50
20	1 40 4	1 45 38	1 51 21	1 57 12	2 3 11	2 9 18	2 15 33	2 21 56	2 28 27	2 35 5	2 41 51	2 48 46	2 55 46	3 2 53	3 10 7
21	1 45 5	1 50 55	1 56 55	2 3 4	2 9 20	2 15 42	2 22 14	2 28 56	2 35 46	2 42 42	2 49 47	2 57 0	3 4 17	3 11 39	3 19 9
22	1 50 46	1 56 54	2 3 12	2 9 39	2 16 13	2 22 54	2 29 47	2 36 51	2 44 0	2 51 14	2 58 38	3 6 10	3 13 47	3 21 30	3 29 21
23	1 57 11	2 3 40	2 10 20	2 17 9	2 24 1	2 30 58	2 38 10	2 45 33	2 53 5	3 0 48	3 8 34	3 16 25	3 24 23	3 32 28	3 40 39

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 55 2	0 57 54	1 0 53	1 3 56	1 7 4	1 10 18	1 13 36	1 17 1	1 20 30	1 24 4	1 27 42	1 31 27	1 35 16	1 39 10	1 43 10
1	0 53 57	0 56 45	0 59 39	1 2 38	1 5 43	1 8 54	1 12 8	1 15 29	1 18 54	1 22 23	1 25 57	1 29 36	1 33 20	1 37 9	1 41 3
2	0 52 54	0 55 38	0 58 28	1 1 23	1 4 24	1 7 32	1 10 43	1 14 0	1 17 20	1 20 45	1 24 15	1 27 48	1 31 27	1 35 11	1 39 0
3	0 51 53	0 54 34	0 57 20	1 0 11	1 3 8	1 6 13	1 9 20	1 12 33	1 15 49	1 19 10	1 22 35	1 26 4	1 29 38	1 33 17	1 37 1
4	0 50 55	0 53 33	0 56 15	0 59 2	1 1 55	1 4 56	1 7 59	1 11 8	1 14 20	1 17 37	1 20 58	1 24 23	1 27 53	1 31 27	1 35 6
5	0 50 0	0 52 35	0 55 13	0 57 56	1 0 45	1 3 42	1 6 41	1 9 46	1 12 54	1 16 7	1 19 24	1 22 45	1 26 11	1 29 41	1 33 15
6	0 49 7	0 51 39	0 54 14	0 56 53	0 59 38	1 2 31	1 5 26	1 8 27	1 11 31	1 14 40	1 17 53	1 21 10	1 24 32	1 27 58	1 31 28
7	0 48 16	0 50 45	0 53 17	0 55 53	0 58 34	1 1 23	1 4 14	1 7 11	1 10 11	1 13 16	1 16 25	1 19 38	1 22 56	1 26 18	1 29 44
8	0 47 27	0 49 53	0 52 22	0 54 55	0 57 33	1 0 18	1 3 5	1 5 58	1 8 54	1 11 55	1 15 0	1 18 9	1 21 23	1 24 41	1 28 3
9	0 46 40	0 49 3	0 51 29	0 53 59	0 56 34	0 59 15	1 1 59	1 4 48	1 7 40	1 10 37	1 13 38	1 16 43	1 19 53	1 23 7	1 26 25
10	0 45 55	0 48 15	0 50 38	0 53 5	0 55 37	0 58 14	1 0 55	1 3 40	1 6 29	1 9 22	1 12 19	1 15 20	1 18 26	1 21 36	1 24 50
11	0 45 11	0 47 28	0 49 48	0 52 11	0 54 40	0 57 14	0 59 52	1 2 34	1 5 20	1 8 10	1 11 3	1 14 0	1 17 2	1 20 8	1 23 18
12	0 44 28	0 46 43	0 48 59	0 51 18	0 53 44	0 56 16	0 58 51	1 1 30	1 4 13	1 7 0	1 9 50	1 12 43	1 15 41	1 18 43	1 21 49
13	0 43 46	0 45 58	0 48 11	0 50 27	0 52 50	0 55 20	0 57 52	1 0 28	1 3 8	1 5 52	1 8 39	1 11 28	1 14 25	1 17 21	1 20 24
14	0 43 5	0 45 14	0 47 25	0 49 38	0 51 58	0 54 25	0 56 55	0 59 28	1 2 5	1 4 46	1 7 30	1 10 16	1 13 8	1 16 2	1 19 2
15	0 42 25	0 44 31	0 46 40	0 48 51	0 51 8	0 53 32	0 56 0	0 58 30	1 1 4	1 3 42	1 6 23	1 9 6	1 11 55	1 14 45	1 17 42
16	0 41 46	0 43 49	0 45 56	0 48 5	0 50 19	0 52 41	0 55 6	0 57 33	1 0 4	1 2 39	1 5 18	1 7 58	1 10 44	1 13 30	1 16 24
17	0 41 7	0 43 8	0 45 13	0 47 20	0 49 32	0 51 51	0 54 13	0 56 37	0 59 6	1 1 38	1 4 14	1 6 52	1 9 35	1 12 17	1 15 8
18	0 40 29	0 42 28	0 44 31	0 46 36	0 48 46	0 51 2	0 53 21	0 55 43	0 58 9	1 0 38	1 3 11	1 5 47	1 8 27	1 11 6	1 13 54
19	0 39 52	0 41 49	0 43 50	0 45 53	0 48 1	0 50 14	0 52 30	0 54 50	0 57 13	0 59 39	1 2 9	1 4 43	1 7 20	1 9 57	1 12 42
20	0 39 16	0 41 11	0 43 10	0 45 12	0 47 18	0 49 27	0 51 40	0 53 58	0 56 18	0 58 41	1 1 8	1 3 40	1 6 14	1 8 51	1 11 32
21	0 38 41	0 40 34	0 42 30	0 44 30	0 46 34	0 48 40	0 50 50	0 53 6	0 55 24	0 57 45	1 0 10	1 2 39	1 5 10	1 7 44	1 10 22
22	0 38 7	0 39 57	0 41 51	0 43 49	0 45 50	0 47 54	0 50 1	0 52 14	0 54 30	0 56 50	0 59 13	1 1 38	1 4 7	1 6 38	1 9 13
23	0 37 33	0 39 21	0 41 13	0 43 9	0 45 7	0 47 8	0 49 13	0 51 23	0 53 37	0 55 55	0 58 15	1 0 38	1 3 4	1 5 33	1 8 5

LATITUDE 35° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 47 13	1 51 22	1 55 36	1 59 55	2 4 18	2 8 50	2 13 19	2 17 57	2 22 39	2 27 26	2 32 18	2 37 15	2 42 14	2 47 20	2 52 30
1	1 49 38	1 53 53	1 58 13	2 2 38	2 7 7	2 11 44	2 16 20	2 21 4	2 25 53	2 30 46	2 35 44	2 40 47	2 45 53	2 51 6	2 56 22
2	1 52 9	1 56 30	2 0 56	2 5 27	2 10 2	2 14 45	2 19 28	2 24 18	2 29 14	2 34 14	2 39 18	2 44 28	2 49 41	2 55 1	3 0 24
3	1 54 46	1 59 13	2 3 45	2 8 23	2 13 4	2 17 53	2 22 43	2 27 40	2 32 43	2 37 50	2 43 1	2 48 18	2 53 39	2 59 6	3 4 36
4	1 57 29	2 2 2	2 6 41	2 10 26	2 16 14	2 21 9	2 26 7	2 31 11	2 36 21	2 41 35	2 46 53	2 52 17	2 57 46	3 3 20	3 8 57
5	2 0 19	2 4 59	2 9 45	2 14 36	2 19 32	2 24 33	2 29 39	2 34 51	2 40 8	2 45 29	2 50 55	2 56 26	3 2 3	3 7 44	3 13 28
6	2 3 21	2 8 8	2 13 1	2 17 59	2 23 3	2 28 11	2 33 25	2 38 45	2 44 10	2 49 40	2 55 14	3 0 53	3 6 38	3 12 27	3 18 20
7	2 6 35	2 11 30	2 16 30	2 21 36	2 26 48	2 32 4	2 37 26	2 42 54	2 48 27	2 54 5	2 59 48	3 5 35	3 11 28	3 17 26	3 23 29
8	2 10 2	2 15 5	2 20 13	2 25 27	2 30 48	2 36 13	2 41 43	2 47 19	2 53 1	2 58 48	3 4 39	3 10 35	3 16 37	3 22 44	3 28 56
9	2 13 41	2 18 52	2 24 9	2 29 31	2 35 1	2 40 36	2 46 15	2 52 0	2 57 51	3 3 46	3 9 47	3 15 53	3 22 4	3 28 19	3 34 38
10	2 17 32	2 22 52	2 28 18	2 33 50	2 39 29	2 45 13	2 51 2	2 56 56	3 2 56	3 9 2	3 15 14	3 21 30	3 27 49	3 34 12	3 40 39
11	2 21 44	2 27 14	2 32 50	2 38 32	2 44 21	2 50 15	2 56 14	3 2 18	3 8 28	3 14 44	3 21 6	3 27 30	3 33 59	3 40 33	3 47 12
12	2 26 10	2 31 50	2 37 37	2 43 29	2 49 28	2 55 32	3 1 41	3 7 55	3 14 15	3 20 41	3 27 14	3 33 50	3 40 30	3 47 16	3 54 8
13	2 30 52	2 36 43	2 42 41	2 48 44	2 54 53	3 1 8	3 7 28	3 13 53	3 20 23	3 27 0	3 33 44	3 40 31	3 47 22	3 54 20	4 1 25
14	2 36 1	2 42 2	2 48 9	2 54 23	3 0 45	3 7 11	3 13 42	3 20 19	3 27 3	3 33 52	3 40 46	3 47 46	3 54 53	4 2 2	4 9 13
15	2 41 33	2 47 47	2 54 6	3 0 33	3 7 8	3 13 46	3 20 28	3 27 18	3 34 15	3 41 15	3 48 21	3 55 33	4 2 52	4 10 16	4 17 45
16	2 47 31	2 53 58	3 0 30	3 7 10	3 13 56	3 20 47	3 27 44	3 34 47	3 41 57	3 49 11	3 56 30	4 3 55	4 11 27	4 19 4	4 26 45
17	2 54 0	3 0 41	3 7 30	3 14 24	3 21 22	3 28 27	3 35 38	3 42 55	3 50 19	3 57 38	4 5 22	4 13 1	4 20 44	4 28 35	4 36 33
18	3 1 9	3 8 4	3 15 3	3 22 11	3 29 28	3 36 48	3 44 13	3 51 45	3 59 23	4 7 6	4 14 54	4 22 48	4 30 47	4 38 51	4 46 59
19	3 8 55	3 16 5	3 23 21	3 30 44	3 38 15	3 45 52	3 53 35	4 1 23	4 9 15	4 17 13	4 25 16	4 33 26	4 41 44	4 49 5	4 58 28
20	3 17 28	3 24 55	3 32 29	3 40 9	3 47 55	3 55 49	4 3 50	4 11 54	4 20 3	4 28 17	4 36 38	4 45 4	4 53 34	5 2 11	5 10 56
21	3 26 50	3 34 37	3 42 29	3 50 27	3 58 32	4 6 43	4 15 1	4 23 23	4 31 49	4 40 22	4 49 1	4 57 45	5 6 33	5 15 26	5 24 23
22	3 37 20	3 45 25	3 53 35	4 1 52	4 10 16	4 18 46	4 27 22	4 36 2	4 44 47	4 53 37	5 2 34	5 11 34	5 20 39	5 29 49	5 39 5
23	3 48 56	3 57 21	4 5 55	4 14 32	4 23 14	4 32 4	4 41 2	4 50 3	4 59 6	5 8 14	5 17 28	5 26 57	5 36 12	5 45 40	5 55 12

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 47 13	1 51 22	1 55 36	1 59 55	2 4 18	2 8 50	2 13 19	2 17 57	2 22 39	2 27 26	2 32 18	2 37 15	2 42 14	2 47 20	2 52 30
1	1 45 2	1 49 6	1 53 15	1 57 30	2 1 49	2 6 14	2 10 37	2 15 8	2 19 45	2 24 27	2 29 13	2 34 4	2 38 56	2 43 55	2 48 58
2	1 42 54	1 46 53	1 50 57	1 55 7	1 59 22	2 3 41	2 7 59	2 12 24	2 16 56	2 21 33	2 26 13	2 30 58	2 35 44	2 40 36	2 45 32
3	1 40 50	1 44 44	1 48 43	1 52 48	1 56 58	2 1 12	2 5 25	2 9 45	2 14 12	2 18 44	2 23 19	2 27 57	2 32 37	2 37 23	2 42 12
4	1 38 50	1 42 39	1 46 33	1 50 33	1 54 38	1 58 47	2 2 55	2 7 10	2 11 32	2 15 59	2 20 29	2 25 0	2 29 35	2 34 15	2 38 58
5	1 36 54	1 40 38	1 44 27	1 48 22	1 52 22	1 56 26	2 0 29	2 4 39	2 8 56	2 13 18	2 17 43	2 22 8	2 26 38	2 31 12	2 35 49
6	1 35 2	1 38 41	1 42 25	1 46 15	1 50 10	1 54 9	1 58 7	2 2 12	2 6 24	2 10 41	2 15 1	2 19 21	2 23 46	2 28 14	2 32 45
7	1 33 14	1 36 48	1 40 27	1 44 12	1 48 2	1 51 56	1 55 50	1 59 50	2 3 56	2 8 8	2 12 23	2 16 38	2 20 58	2 25 21	2 29 46
8	1 31 29	1 34 59	1 38 33	1 42 13	1 45 58	1 49 47	1 53 37	1 57 32	2 1 33	2 5 39	2 9 49	2 14 0	2 18 15	2 22 33	2 26 53
9	1 29 47	1 33 13	1 36 43	1 40 18	1 43 58	1 47 42	1 51 28	1 55 18	1 59 14	2 3 15	2 7 20	2 11 27	2 15 37	2 19 50	2 24 5
10	1 28 8	1 31 30	1 34 56	1 38 27	1 42 2	1 45 41	1 49 23	1 53 9	1 57 0	2 0 56	2 4 56	2 8 59	2 13 4	2 17 12	2 21 23
11	1 26 32	1 29 50	1 33 12	1 36 39	1 40 10	1 43 44	1 47 23	1 51 4	1 54 51	1 58 43	2 2 38	2 6 36	2 10 36	2 14 39	2 18 46
12	1 25 0	1 28 14	1 31 32	1 34 55	1 38 22	1 41 52	1 45 26	1 49 3	1 52 46	1 56 34	2 0 25	2 4 18	2 8 13	2 12 11	2 16 14
13	1 23 31	1 26 42	1 29 56	1 33 15	1 36 38	1 40 4	1 43 33	1 47 6	1 50 45	1 54 29	1 58 16	2 2 5	2 5 55	2 9 48	2 13 47
14	1 22 5	1 25 13	1 28 23	1 31 38	1 34 57	1 38 19	1 41 44	1 45 13	1 48 48	1 52 28	1 56 11	1 59 56	2 3 42	2 7 30	2 11 25
15	1 20 42	1 23 47	1 26 53	1 30 4	1 33 19	1 36 37	1 39 59	1 43 24	1 46 55	1 50 31	1 54 10	1 57 51	2 1 33	2 5 17	2 9 8
16	1 19 21	1 22 23	1 25 26	1 28 33	1 31 44	1 34 58	1 38 17	1 41 39	1 45 6	1 48 38	1 52 13	1 55 50	1 59 28	2 3 8	2 6 55
17	1 18 2	1 21 1	1 24 1	1 27 5	1 30 12	1 33 22	1 36 38	1 39 57	1 43 20	1 46 48	1 50 19	1 53 52	1 57 26	2 1 3	2 4 46
18	1 16 45	1 19 41	1 22 38	1 25 39	1 28 43	1 31 49	1 35 2	1 38 18	1 41 37	1 45 1	1 48 28	1 51 57	1 55 27	1 59 2	2 2 41
19	1 15 30	1 18 22	1 21 16	1 24 14	1 27 15	1 30 19	1 33 29	1 36 42	1 39 57	1 43 17	1 46 40	1 50 5	1 53 32	1 57 4	2 0 39
20	1 14 17	1 17 5	1 19 56	1 22 51	1 25 49	1 28 51	1 31 58	1 35 7	1 38 19	1 41 35	1 44 54	1 48 16	1 51 40	1 55 9	1 58 40
21	1 13 5	1 15 50	1 18 38	1 21 30	1 24 24	1 27 24	1 30 27	1 33 33	1 36 42	1 39 54	1 43 10	1 46 28	1 49 49	1 53 15	1 56 42
22	1 11 53	1 14 35	1 17 21	1 20 10	1 23 0	1 25 57	1 28 57	1 32 0	1 35 5	1 38 14	1 41 26	1 44 41	1 47 59	1 51 21	1 54 45
23	1 10 41	1 13 21	1 16 4	1 18 50	1 21 38	1 24 31	1 27 28	1 30 27	1 33 29	1 36 34	1 39 43	1 42 55	1 46 10	1 49 28	1 52 49

LATITUDE 36° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 35	0 10 44	0 10 57	0 11 16	0 11 40	0 12 10	0 12 45	0 13 26	0 14 11	0 15 3	0 15 59	0 17 1	0 18 9	0 19 21	0 20 39
1	0 10 37	0 10 45	0 10 59	0 11 18	0 11 43	0 12 14	0 12 50	0 13 32	0 14 18	0 15 11	0 16 8	0 17 11	0 18 21	0 19 35	0 20 55
2	0 10 39	0 10 46	0 11 1	0 11 20	0 11 46	0 12 18	0 12 55	0 13 38	0 14 25	0 15 19	0 16 18	0 17 22	0 18 34	0 19 50	0 21 12
3	0 10 41	0 10 48	0 11 3	0 11 22	0 11 49	0 12 22	0 13 0	0 13 44	0 14 32	0 15 27	0 16 28	0 17 34	0 18 48	0 20 6	0 21 30
4	0 10 43	0 10 50	0 11 5	0 11 25	0 11 53	0 12 26	0 13 5	0 13 50	0 14 40	0 15 36	0 16 39	0 17 46	0 19 2	0 20 22	0 21 48
5	0 10 45	0 10 52	0 11 7	0 11 28	0 11 57	0 12 30	0 13 11	0 13 57	0 14 48	0 15 46	0 16 51	0 17 59	0 19 17	0 20 39	0 22 8
6	0 10 47	0 10 54	0 11 9	0 11 31	0 12 1	0 12 35	0 13 17	0 14 4	0 14 57	0 15 56	0 17 3	0 18 13	0 19 33	0 20 57	0 22 29
7	0 10 48	0 10 56	0 11 11	0 11 34	0 12 5	0 12 40	0 13 23	0 14 11	0 15 6	0 16 7	0 17 16	0 18 28	0 19 50	0 21 16	0 22 51
8	0 10 49	0 10 58	0 11 13	0 11 37	0 12 9	0 12 45	0 13 29	0 14 18	0 15 15	0 16 18	0 17 29	0 18 44	0 20 8	0 21 37	0 23 15
9	0 10 50	0 11 0	0 11 16	0 11 40	0 12 13	0 12 50	0 13 35	0 14 26	0 15 25	0 16 30	0 17 43	0 19 1	0 20 27	0 21 59	0 23 40
10	0 10 51	0 11 2	0 11 19	0 11 43	0 12 17	0 12 55	0 13 41	0 14 34	0 15 35	0 16 43	0 17 58	0 19 19	0 20 48	0 22 23	0 24 7
11	0 10 52	0 11 3	0 11 21	0 11 47	0 12 21	0 13 0	0 13 48	0 14 43	0 15 46	0 16 57	0 18 14	0 19 38	0 21 11	0 22 49	0 24 36
12	0 10 53	0 11 5	0 11 23	0 11 51	0 12 25	0 13 6	0 13 56	0 14 53	0 15 58	0 17 12	0 18 32	0 19 59	0 21 36	0 23 17	0 25 8
13	0 10 54	0 11 7	0 11 25	0 11 55	0 12 30	0 13 12	0 14 4	0 15 4	0 16 11	0 17 29	0 18 52	0 20 21	0 22 3	0 23 47	0 25 43
14	0 10 55	0 11 9	0 11 28	0 11 59	0 12 35	0 13 19	0 14 13	0 15 15	0 16 25	0 17 47	0 19 13	0 20 45	0 22 32	0 24 20	0 26 20
15	0 10 56	0 11 11	0 11 31	0 12 3	0 12 40	0 13 27	0 14 23	0 15 27	0 16 40	0 18 6	0 19 35	0 21 11	0 23 2	0 24 54	0 26 59
16	0 10 57	0 11 13	0 11 34	0 12 7	0 12 46	0 13 35	0 14 33	0 15 40	0 16 56	0 18 26	0 19 58	0 21 39	0 23 33	0 25 30	0 27 40
17	0 10 58	0 11 15	0 11 37	0 12 11	0 12 52	0 13 43	0 14 44	0 15 54	0 17 13	0 18 47	0 20 23	0 22 9	0 24 7	0 26 9	0 28 24
18	0 11 0	0 11 17	0 11 40	0 12 15	0 12 59	0 13 52	0 14 56	0 16 9	0 17 32	0 19 10	0 20 50	0 22 41	0 24 43	0 26 51	0 29 12
19	0 11 2	0 11 19	0 11 43	0 12 20	0 13 6	0 14 2	0 15 9	0 16 25	0 17 52	0 19 34	0 21 19	0 23 15	0 25 22	0 27 37	0 30 5
20	0 11 4	0 11 21	0 11 46	0 12 25	0 13 14	0 14 13	0 15 23	0 16 43	0 18 14	0 20 0	0 21 50	0 23 52	0 26 6	0 28 29	0 31 5
21	0 11 6	0 11 23	0 11 50	0 12 31	0 13 23	0 14 25	0 15 39	0 17 3	0 18 39	0 20 30	0 22 26	0 24 36	0 26 57	0 29 28	0 32 13
22	0 11 8	0 11 25	0 11 54	0 12 37	0 13 33	0 14 38	0 15 58	0 17 26	0 19 8	0 21 5	0 23 9	0 25 28	0 27 57	0 30 37	0 33 31
23	0 11 10	0 11 28	0 11 58	0 12 44	0 13 44	0 14 53	0 16 20	0 17 53	0 19 42	0 21 46	0 23 59	0 26 28	0 29 7	0 31 58	0 35 2

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 35	0 10 44	0 10 57	0 11 16	0 11 40	0 12 10	0 12 45	0 13 26	0 14 11	0 15 3	0 15 59	0 17 1	0 18 9	0 19 21	0 20 39
1	0 10 34	0 10 42	0 10 55	0 11 14	0 11 37	0 12 7	0 12 40	0 13 21	0 14 4	0 14 55	0 15 50	0 16 51	0 17 58	0 19 8	0 20 25
2	0 10 32	0 10 40	0 10 53	0 11 12	0 11 34	0 12 4	0 12 35	0 13 16	0 13 57	0 14 47	0 15 41	0 16 41	0 17 47	0 18 55	0 20 11
3	0 10 30	0 10 38	0 10 51	0 11 9	0 11 31	0 12 0	0 12 30	0 13 11	0 13 51	0 14 40	0 15 32	0 16 31	0 17 36	0 18 43	0 19 57
4	0 10 28	0 10 36	0 10 49	0 11 6	0 11 28	0 11 56	0 12 25	0 13 6	0 13 45	0 14 33	0 15 24	0 16 21	0 17 25	0 18 31	0 19 43
5	0 10 26	0 10 34	0 10 47	0 11 3	0 11 25	0 11 52	0 12 20	0 13 1	0 13 39	0 14 26	0 15 16	0 16 11	0 17 14	0 18 19	0 19 29
6	0 10 24	0 10 32	0 10 45	0 11 0	0 11 22	0 11 48	0 12 16	0 12 56	0 13 33	0 14 19	0 15 8	0 16 2	0 17 3	0 18 7	0 19 15
7	0 10 22	0 10 30	0 10 42	0 10 57	0 11 19	0 11 44	0 12 12	0 12 51	0 13 27	0 14 12	0 15 0	0 15 53	0 16 52	0 17 55	0 19 1
8	0 10 20	0 10 28	0 10 39	0 10 54	0 11 16	0 11 40	0 12 8	0 12 45	0 13 21	0 14 5	0 14 52	0 15 44	0 16 41	0 17 43	0 18 48
9	0 10 18	0 10 25	0 10 36	0 10 51	0 11 12	0 11 36	0 12 4	0 12 39	0 13 15	0 13 58	0 14 44	0 15 35	0 16 31	0 17 31	0 18 35
10	0 10 16	0 10 22	0 10 33	0 10 48	0 11 8	0 11 32	0 12 0	0 12 33	0 13 9	0 13 51	0 14 36	0 15 26	0 16 21	0 17 19	0 18 22
11	0 10 13	0 10 19	0 10 30	0 10 45	0 11 4	0 11 28	0 11 56	0 12 27	0 13 3	0 13 44	0 14 28	0 15 17	0 16 11	0 17 8	0 18 10
12	0 10 10	0 10 16	0 10 27	0 10 42	0 11 0	0 11 24	0 11 52	0 12 21	0 12 57	0 13 37	0 14 20	0 15 8	0 16 1	0 16 57	0 17 58
13	0 10 7	0 10 13	0 10 24	0 10 39	0 10 56	0 11 20	0 11 47	0 12 15	0 12 51	0 13 30	0 14 12	0 14 59	0 15 51	0 16 46	0 17 46
14	0 10 4	0 10 10	0 10 21	0 10 36	0 10 52	0 11 16	0 11 42	0 12 9	0 12 45	0 13 23	0 14 4	0 14 50	0 15 41	0 16 36	0 17 34
15	0 10 1	0 10 7	0 10 18	0 10 32	0 10 48	0 11 12	0 11 37	0 12 4	0 12 39	0 13 16	0 13 56	0 14 42	0 15 32	0 16 26	0 17 23
16	0 9 58	0 10 4	0 10 15	0 10 28	0 10 44	0 11 8	0 11 32	0 11 59	0 12 33	0 13 9	0 13 49	0 14 34	0 15 23	0 16 16	0 17 12
17	0 9 55	0 10 1	0 10 12	0 10 24	0 10 40	0 11 3	0 11 27	0 11 54	0 12 27	0 13 2	0 13 42	0 14 26	0 15 14	0 16 6	0 17 1
18	0 9 52	0 9 58	0 10 8	0 10 20	0 10 36	0 10 58	0 11 22	0 11 49	0 12 21	0 12 55	0 13 35	0 14 18	0 15 5	0 15 56	0 16 50
19	0 9 49	0 9 55	0 10 4	0 10 16	0 10 32	0 10 53	0 11 17	0 11 44	0 12 15	0 12 49	0 13 28	0 14 10	0 14 56	0 15 46	0 16 39
20	0 9 45	0 9 51	0 10 0	0 10 12	0 10 28	0 10 48	0 11 12	0 11 39	0 12 9	0 12 43	0 13 21	0 14 2	0 14 47	0 15 36	0 16 28
21	0 9 42	0 9 48	0 9 57	0 10 9	0 10 24	0 10 44	0 11 7	0 11 34	0 12 4	0 12 37	0 13 14	0 13 55	0 14 39	0 15 27	0 16 18
22	0 9 39	0 9 45	0 9 54	0 10 6	0 10 21	0 10 40	0 11 3	0 11 29	0 11 59	0 12 31	0 13 8	0 13 48	0 14 31	0 15 18	0 16 8
23	0 9 37	0 9 42	0 9 51	0 10 3	0 10 18	0 10 37	0 10 59	0 11 25	0 11 54	0 12 26	0 13 2	0 13 41	0 14 24	0 15 10	0 15 59

LATITUDE 36° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 22 3	0 23 31	0 25 5	0 26 44	0 28 29	0 30 19	0 32 14	0 34 14	0 36 20	0 38 31	0 40 47	0 43 8	0 45 34	0 48 5	0 50 42
1	0 22 19	0 23 49	0 25 26	0 27 7	0 28 55	0 30 48	0 32 46	0 34 50	0 36 59	0 39 14	0 41 33	0 43 59	0 46 29	0 49 4	0 51 41
2	0 22 36	0 24 8	0 25 48	0 27 32	0 29 23	0 31 19	0 33 20	0 35 28	0 37 40	0 39 59	0 42 22	0 44 52	0 47 26	0 50 5	0 52 43
3	0 22 54	0 24 29	0 26 12	0 27 59	0 29 53	0 31 52	0 33 56	0 36 8	0 38 23	0 40 46	0 43 13	0 45 47	0 48 25	0 51 8	0 53 48
4	0 23 14	0 24 52	0 26 38	0 28 28	0 30 25	0 32 27	0 34 34	0 36 50	0 39 8	0 41 35	0 44 6	0 46 44	0 49 26	0 52 13	0 54 57
5	0 23 36	0 25 17	0 27 6	0 28 59	0 30 59	0 33 4	0 35 14	0 37 34	0 39 56	0 42 27	0 45 2	0 47 44	0 50 31	0 53 22	0 56 10
6	0 24 0	0 25 44	0 27 36	0 29 32	0 31 35	0 33 43	0 35 57	0 38 21	0 40 47	0 43 22	0 46 1	0 48 47	0 51 39	0 54 34	0 57 26
7	0 24 26	0 26 13	0 28 8	0 30 8	0 32 13	0 34 24	0 36 42	0 39 10	0 41 40	0 44 19	0 47 3	0 49 53	0 52 50	0 55 49	0 58 47
8	0 24 54	0 26 44	0 28 42	0 30 45	0 32 54	0 35 8	0 37 30	0 40 2	0 42 36	0 45 19	0 48 8	0 51 3	0 54 5	0 57 8	1 0 13
9	0 25 24	0 27 17	0 29 19	0 31 25	0 33 38	0 35 56	0 38 22	0 40 58	0 43 36	0 46 23	0 49 16	0 52 16	0 55 23	0 58 31	1 1 47
10	0 25 56	0 27 52	0 29 58	0 32 6	0 34 24	0 36 47	0 39 18	0 41 58	0 44 40	0 47 31	0 50 28	0 53 33	0 56 45	1 0 0	1 3 25
11	0 26 31	0 28 29	0 30 39	0 32 52	0 35 13	0 37 41	0 40 16	0 43 1	0 45 48	0 48 44	0 51 46	0 54 57	0 58 15	1 1 37	1 5 9
12	0 27 8	0 29 9	0 31 23	0 33 41	0 36 6	0 38 39	0 41 18	0 44 8	0 47 1	0 50 3	0 53 11	0 56 28	0 59 53	1 3 22	1 7 0
13	0 27 47	0 29 52	0 32 10	0 34 33	0 37 3	0 39 41	0 42 25	0 45 21	0 48 19	0 51 29	0 54 43	0 58 7	1 1 39	1 5 16	1 9 0
14	0 28 28	0 30 38	0 33 1	0 35 29	0 38 4	0 40 47	0 43 37	0 46 40	0 49 44	0 53 2	0 56 23	0 59 55	1 3 35	1 7 20	1 11 12
15	0 29 11	0 31 27	0 33 55	0 36 29	0 39 10	0 41 59	0 44 56	0 48 6	0 51 17	0 54 43	0 58 12	1 1 53	1 5 42	1 9 36	1 13 30
16	0 29 56	0 32 19	0 34 53	0 37 34	0 40 21	0 43 17	0 46 22	0 49 40	0 52 59	0 56 33	1 0 12	1 4 2	1 8 0	1 12 3	1 16 5
17	0 30 45	0 33 15	0 35 56	0 38 44	0 41 39	0 44 43	0 47 57	0 51 23	0 54 51	0 58 34	1 2 23	1 6 22	1 10 29	1 14 42	1 18 51
18	0 31 39	0 34 17	0 37 5	0 40 1	0 43 5	0 46 18	0 49 41	0 53 16	0 56 54	1 0 46	1 4 45	1 8 53	1 13 10	1 17 34	1 21 53
19	0 32 39	0 35 26	0 38 21	0 41 26	0 44 41	0 48 3	0 51 36	0 55 20	0 59 9	1 3 11	1 7 20	1 11 37	1 16 5	1 20 40	1 25 16
20	0 33 47	0 36 43	0 39 46	0 43 1	0 46 27	0 50 0	0 53 43	0 57 37	1 1 39	1 5 51	1 10 10	1 14 37	1 19 17	1 24 4	1 29 0
21	0 35 5	0 38 10	0 41 23	0 44 49	0 48 26	0 52 11	0 56 5	1 0 11	1 4 26	1 8 49	1 13 22	1 18 3	1 22 56	1 27 58	1 33 10
22	0 36 34	0 39 50	0 43 14	0 46 52	0 50 41	0 54 39	0 58 45	1 3 5	1 7 34	1 12 11	1 16 59	1 21 55	1 27 3	1 32 22	1 37 48
23	0 38 17	0 41 44	0 45 22	0 49 14	0 53 15	0 57 27	1 1 48	1 6 23	1 11 8	1 16 2	1 21 7	1 26 20	1 31 44	1 37 21	1 43 4

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 22 3	0 23 31	0 25 5	0 26 44	0 28 29	0 30 19	0 32 14	0 34 14	0 36 20	0 38 31	0 40 47	0 43 8	0 45 34	0 48 5	0 50 42
1	0 21 46	0 23 12	0 24 44	0 26 21	0 28 4	0 29 52	0 31 44	0 33 41	0 35 43	0 37 49	0 40 1	0 42 20	0 44 42	0 47 10	0 49 44
2	0 21 29	0 22 53	0 24 23	0 25 58	0 27 39	0 29 25	0 31 14	0 33 9	0 35 7	0 37 9	0 39 18	0 41 34	0 43 53	0 46 18	0 48 49
3	0 21 13	0 22 35	0 24 3	0 25 36	0 27 15	0 28 58	0 30 45	0 32 38	0 34 33	0 36 32	0 38 38	0 40 50	0 43 6	0 45 28	0 47 56
4	0 20 57	0 22 17	0 23 43	0 25 14	0 26 51	0 28 32	0 30 17	0 32 7	0 34 0	0 35 57	0 38 0	0 40 8	0 42 21	0 44 40	0 47 5
5	0 20 41	0 21 59	0 23 23	0 24 52	0 26 27	0 28 6	0 29 49	0 31 37	0 33 28	0 35 23	0 37 23	0 39 28	0 41 38	0 43 54	0 46 16
6	0 20 26	0 21 42	0 23 4	0 24 31	0 26 4	0 27 41	0 29 22	0 31 8	0 32 57	0 34 50	0 36 48	0 38 50	0 40 57	0 43 10	0 45 29
7	0 20 11	0 21 26	0 22 46	0 24 11	0 25 42	0 27 17	0 28 56	0 30 40	0 32 27	0 34 18	0 36 14	0 38 14	0 40 18	0 42 28	0 44 44
8	0 19 57	0 21 11	0 22 29	0 23 52	0 25 21	0 26 54	0 28 31	0 30 13	0 31 58	0 33 47	0 35 41	0 37 39	0 39 41	0 41 48	0 44 1
9	0 19 43	0 20 56	0 22 13	0 23 34	0 25 1	0 26 32	0 28 7	0 29 47	0 31 30	0 33 17	0 35 9	0 37 5	0 39 5	0 41 9	0 43 19
10	0 19 29	0 20 41	0 21 57	0 23 17	0 24 42	0 26 11	0 27 44	0 29 22	0 31 3	0 32 48	0 34 38	0 36 32	0 38 30	0 40 32	0 42 39
11	0 19 16	0 20 27	0 21 41	0 23 0	0 24 23	0 25 50	0 27 21	0 28 57	0 30 36	0 32 19	0 34 7	0 35 59	0 37 55	0 39 55	0 41 59
12	0 19 3	0 20 13	0 21 25	0 22 43	0 24 4	0 25 29	0 26 58	0 28 32	0 30 9	0 31 50	0 33 36	0 35 27	0 37 21	0 39 18	0 41 20
13	0 18 50	0 19 59	0 21 9	0 22 26	0 23 45	0 25 8	0 26 36	0 28 8	0 29 43	0 31 22	0 33 6	0 34 55	0 36 47	0 38 42	0 40 42
14	0 18 37	0 19 45	0 20 54	0 22 9	0 23 26	0 24 48	0 26 14	0 27 45	0 29 18	0 30 55	0 32 37	0 34 24	0 36 14	0 38 7	0 40 4
15	0 18 24	0 19 31	0 20 39	0 21 52	0 23 7	0 24 28	0 25 53	0 27 22	0 28 53	0 30 28	0 32 8	0 33 53	0 35 41	0 37 32	0 39 27
16	0 18 12	0 19 17	0 20 24	0 21 35	0 22 49	0 24 9	0 25 32	0 27 0	0 28 29	0 30 2	0 31 40	0 33 23	0 35 9	0 36 58	0 38 51
17	0 18 0	0 19 3	0 20 9	0 21 19	0 22 32	0 23 50	0 25 12	0 26 38	0 28 6	0 29 37	0 31 13	0 32 54	0 34 38	0 36 25	0 38 16
18	0 17 48	0 18 49	0 19 54	0 21 3	0 22 15	0 23 32	0 24 52	0 26 16	0 27 43	0 29 13	0 30 47	0 32 26	0 34 8	0 35 53	0 37 42
19	0 17 36	0 18 36	0 19 40	0 20 48	0 21 59	0 23 14	0 24 33	0 25 55	0 27 21	0 28 50	0 30 22	0 31 59	0 33 39	0 35 22	0 37 9
20	0 17 24	0 18 23	0 19 26	0 20 33	0 21 43	0 22 56	0 24 14	0 25 34	0 26 59	0 28 27	0 29 58	0 31 33	0 33 11	0 34 52	0 36 37
21	0 17 13	0 18 11	0 19 13	0 20 18	0 21 27	0 22 39	0 23 56	0 25 14	0 26 38	0 28 4	0 29 34	0 31 7	0 32 44	0 34 23	0 36 7
22	0 17 2	0 17 59	0 19 0	0 20 4	0 21 12	0 22 23	0 23 38	0 24 55	0 26 17	0 27 42	0 29 11	0 30 42	0 32 17	0 33 55	0 35 37
23	0 16 52	0 17 48	0 18 48	0 19 51	0 20 58	0 22 7	0 23 21	0 24 37	0 25 57	0 27 21	0 28 48	0 30 18	0 31 51	0 33 28	0 35 8

LATITUDE 36° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 53 24	0 56 10	0 59 3	1 1 59	1 5 1	1 8 8	1 11 20	1 14 37	1 17 59	1 21 26	1 24 57	1 28 34	1 32 15	1 36 1	1 39 53
1	0 54 26	0 57 16	1 0 13	1 3 14	1 6 20	1 9 31	1 12 48	1 16 10	1 19 37	1 23 8	1 26 44	1 30 25	1 34 12	1 38 3	1 42 0
2	0 55 31	0 58 25	1 1 26	1 4 33	1 7 44	1 10 59	1 14 20	1 17 47	1 21 19	1 24 55	1 28 36	1 32 22	1 36 14	1 40 10	1 44 13
3	0 56 40	0 59 39	1 2 44	1 5 56	1 9 12	1 12 31	1 15 57	1 19 29	1 23 6	1 26 47	1 30 33	1 34 24	1 38 21	1 42 23	1 46 31
4	0 57 54	1 0 58	1 4 8	1 7 23	1 10 44	1 14 8	1 17 39	1 21 16	1 24 58	1 28 45	1 32 37	1 36 34	1 40 37	1 44 44	1 48 57
5	0 59 13	1 2 23	1 5 37	1 8 55	1 12 20	1 15 51	1 19 27	1 23 9	1 26 56	1 30 49	1 34 47	1 38 51	1 43 0	1 47 13	1 51 32
6	1 0 34	1 3 48	1 7 8	1 10 32	1 14 3	1 17 39	1 21 21	1 25 9	1 29 2	1 33 0	1 37 4	1 41 14	1 45 30	1 49 50	1 54 16
7	1 2 0	1 5 19	1 8 44	1 12 15	1 15 52	1 19 33	1 23 21	1 27 16	1 31 15	1 35 19	1 39 29	1 43 45	1 48 7	1 52 35	1 57 8
8	1 3 31	1 6 55	1 10 26	1 14 4	1 17 47	1 21 34	1 25 29	1 29 30	1 33 36	1 37 46	1 42 2	1 46 24	1 50 53	1 55 28	2 0 9
9	1 5 9	1 8 39	1 12 16	1 16 0	1 19 49	1 23 43	1 27 44	1 31 52	1 36 5	1 40 23	1 44 46	1 49 16	1 53 52	1 58 34	2 3 22
10	1 6 55	1 10 32	1 14 15	1 18 5	1 22 0	1 26 2	1 30 9	1 34 23	1 38 43	1 43 10	1 47 42	1 52 21	1 57 5	2 1 55	2 6 50
11	1 8 46	1 12 29	1 16 18	1 20 14	1 24 17	1 28 26	1 32 42	1 37 5	1 41 33	1 46 7	1 50 47	1 55 34	2 0 26	2 5 24	2 10 28
12	1 10 44	1 14 34	1 18 31	1 22 34	1 26 45	1 31 4	1 35 21	1 39 58	1 44 34	1 49 16	1 54 5	1 59 0	2 4 1	2 9 9	2 14 22
13	1 12 51	1 16 48	1 20 54	1 25 7	1 29 26	1 33 51	1 38 23	1 43 3	1 47 48	1 52 40	1 57 38	2 2 42	2 7 52	2 13 9	2 18 31
14	1 15 9	1 19 12	1 23 26	1 27 48	1 32 17	1 36 52	1 41 34	1 46 21	1 51 17	1 56 19	2 1 26	2 6 40	2 12 0	2 17 25	2 22 58
15	1 17 38	1 21 54	1 26 17	1 30 47	1 35 24	1 40 9	1 45 1	1 49 59	1 55 3	2 0 14	2 5 32	2 10 58	2 16 29	2 22 5	2 27 48
16	1 20 21	1 24 46	1 29 19	1 34 0	1 38 47	1 43 41	1 48 43	1 53 53	1 59 9	2 4 31	2 10 0	2 15 35	2 21 18	2 27 9	2 33 5
17	1 23 19	1 27 56	1 32 39	1 37 28	1 42 26	1 47 33	1 52 47	1 58 8	2 3 36	2 9 10	2 14 50	2 20 38	2 26 33	2 32 34	2 38 42
18	1 26 33	1 31 23	1 36 18	1 41 19	1 46 29	1 51 47	1 57 13	2 2 47	2 8 27	2 14 12	2 20 5	2 26 7	2 32 15	2 38 29	2 44 56
19	1 30 6	1 35 6	1 40 14	1 45 31	1 50 54	1 56 24	2 2 3	2 7 51	2 13 44	2 19 43	2 25 49	2 32 10	2 38 32	2 44 58	2 51 32
20	1 34 4	1 39 17	1 44 39	1 50 9	1 55 46	2 1 30	2 7 23	2 13 27	2 19 35	2 25 49	2 32 11	2 38 43	2 45 20	2 52 5	2 58 56
21	1 38 29	1 43 56	1 49 32	1 55 18	2 1 11	2 7 11	2 13 20	2 19 37	2 26 1	2 32 33	2 39 13	2 46 0	2 52 53	2 59 52	3 6 59
22	1 43 24	1 49 8	1 55 1	2 1 3	2 7 13	2 13 30	2 19 56	2 26 31	2 33 13	2 40 1	2 46 58	2 54 3	3 1 15	3 8 33	3 15 57
23	1 49 57	1 54 59	2 1 11	2 7 32	2 13 59	2 30 34	2 37 19	2 34 13	2 41 15	2 48 23	2 55 39	3 3 3	3 10 33	3 18 9	3 25 52

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 53 24	0 56 10	0 59 3	1 1 59	1 5 1	1 8 8	1 11 20	1 14 37	1 17 59	1 21 26	1 24 57	1 28 34	1 32 15	1 36 1	1 39 53
1	0 52 23	0 55 6	0 57 55	1 0 48	1 3 46	1 6 49	1 9 56	1 13 9	1 16 26	1 19 48	1 23 16	1 26 50	1 30 25	1 34 7	1 37 53
2	0 51 25	0 54 5	0 56 50	0 59 40	1 2 34	1 5 32	1 8 35	1 11 44	1 14 57	1 18 14	1 21 38	1 25 9	1 28 39	1 32 16	1 35 59
3	0 50 29	0 53 6	0 55 48	0 58 34	1 1 24	1 4 18	1 7 17	1 10 22	1 13 31	1 16 44	1 20 4	1 23 31	1 26 56	1 30 29	1 34 7
4	0 49 35	0 52 9	0 54 48	0 57 30	1 0 16	1 3 7	1 6 2	1 9 3	1 12 8	1 15 17	1 18 33	1 21 56	1 25 17	1 28 46	1 32 19
5	0 48 43	0 51 14	0 53 50	0 56 28	0 59 11	1 1 59	1 4 50	1 7 47	1 10 48	1 13 53	1 17 5	1 20 24	1 23 41	1 27 6	1 30 35
6	0 47 53	0 50 21	0 52 53	0 55 28	0 58 8	1 0 53	1 3 41	1 6 34	1 9 31	1 12 32	1 15 40	1 18 55	1 22 8	1 25 29	1 28 54
7	0 47 5	0 49 30	0 51 58	0 54 30	0 57 7	0 59 49	1 2 34	1 5 23	1 8 16	1 11 14	1 14 18	1 17 29	1 20 38	1 23 55	1 27 16
8	0 46 18	0 48 40	0 51 5	0 53 34	0 56 8	0 58 47	1 1 29	1 4 14	1 7 4	1 9 59	1 12 59	1 16 5	1 19 11	1 22 24	1 25 41
9	0 45 33	0 47 52	0 50 14	0 52 40	0 55 11	0 57 47	1 0 26	1 3 8	1 5 55	1 8 47	1 11 43	1 14 44	1 17 47	1 20 56	1 24 9
10	0 44 50	0 47 6	0 49 25	0 51 48	0 54 16	0 56 49	0 59 25	1 2 4	1 4 48	1 7 37	1 10 30	1 13 26	1 16 26	1 19 31	1 22 40
11	0 44 8	0 46 21	0 48 36	0 50 57	0 53 23	0 55 53	0 58 26	1 1 2	1 3 43	1 6 29	1 9 19	1 12 9	1 15 7	1 18 8	1 21 13
12	0 43 27	0 45 36	0 47 48	0 50 7	0 52 31	0 54 58	0 57 28	1 0 1	1 2 40	1 5 22	1 8 9	1 10 55	1 13 50	1 16 48	1 19 49
13	0 42 46	0 44 52	0 47 2	0 49 18	0 51 40	0 54 4	0 56 31	0 59 1	1 1 38	1 4 17	1 7 1	1 9 43	1 12 35	1 15 30	1 18 28
14	0 42 6	0 44 9	0 46 17	0 48 30	0 50 50	0 53 11	0 55 35	0 58 2	1 0 37	1 3 13	1 5 54	1 8 33	1 11 22	1 14 14	1 17 9
15	0 41 27	0 43 28	0 45 34	0 47 44	0 50 2	0 52 20	0 54 42	0 57 5	0 59 37	1 2 10	1 4 48	1 7 25	1 10 11	1 13 0	1 15 52
16	0 40 49	0 42 48	0 44 52	0 47 0	0 49 15	0 51 30	0 53 49	0 56 10	0 58 39	1 1 9	1 3 44	1 6 19	1 9 2	1 11 48	1 14 37
17	0 40 12	0 42 9	0 44 11	0 46 17	0 48 29	0 50 41	0 52 58	0 55 17	0 57 43	1 0 10	1 2 42	1 5 15	1 7 55	1 10 38	1 13 24
18	0 39 36	0 41 31	0 43 31	0 45 35	0 47 44	0 49 54	0 52 9	0 54 26	0 56 49	0 59 13	1 1 42	1 4 13	1 6 50	1 9 30	1 12 13
19	0 39 1	0 40 54	0 42 52	0 44 54	0 47 0	0 49 8	0 51 21	0 53 36	0 55 56	0 58 18	1 0 44	1 3 13	1 5 47	1 8 24	1 11 4
20	0 38 26	0 40 18	0 42 14	0 44 14	0 46 17	0 48 23	0 50 33	0 52 47	0 55 4	0 57 24	0 59 48	1 2 15	1 4 46	1 7 20	1 9 57
21	0 37 54	0 39 44	0 41 37	0 43 35	0 45 36	0 47 40	0 49 47	0 51 59	0 54 13	0 56 31	0 58 53	1 1 17	1 3 46	1 6 17	1 8 51
22	0 37 22	0 39 10	0 41 1	0 42 57	0 44 55	0 46 57	0 49 2	0 51 11	0 53 23	0 55 39	0 57 59	1 0 20	1 2 46	1 5 15	1 7 40
23	0 36 51	0 38 37	0 40 26	0 42 19	0 44 15	0 46 15	0 48 18	0 50 24	0 52 34	0 54 48	0 57 5	0 59 24	1 1 47	1 4 13	1 6 42

LATITUDE 36° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 43 48	1 47 49	1 51 54	1 56 4	2 0 18	2 4 38	2 9 1	2 13 30	2 18 3	2 22 44	2 27 26	2 32 9	2 37 0	2 41 56	2 46 55
1	1 46 1	1 50 7	1 54 17	1 58 32	2 2 52	2 7 18	2 11 47	2 16 22	2 21 1	2 25 47	2 30 35	2 35 25	2 40 22	2 45 24	2 50 29
2	1 48 20	1 52 31	1 56 46	2 1 7	2 5 34	2 10 6	2 14 41	2 19 21	2 24 6	2 28 57	2 33 52	2 38 49	2 43 52	2 49 0	2 54 12
3	1 50 45	1 55 2	1 59 22	2 3 49	2 8 23	2 13 1	2 17 43	2 22 29	2 27 20	2 32 16	2 37 18	2 42 23	2 47 32	2 52 46	2 58 5
4	1 53 17	1 57 40	2 2 8	2 6 41	2 11 21	2 16 5	2 20 54	2 25 46	2 30 44	2 35 46	2 40 55	2 46 7	2 51 23	2 56 44	3 2 11
5	1 55 57	2 0 27	2 5 3	2 9 43	2 14 28	2 19 18	2 24 14	2 29 14	2 34 18	2 39 28	2 44 43	2 50 2	2 55 26	3 0 55	3 6 30
6	1 58 48	2 3 25	2 8 7	2 12 54	2 17 46	2 22 43	2 27 45	2 32 53	2 38 5	2 43 22	2 48 44	2 54 11	2 59 43	3 5 20	3 11 3
7	2 1 47	2 6 31	2 11 20	2 16 14	2 21 14	2 26 18	2 31 28	2 36 44	2 42 5	2 47 29	2 52 59	2 58 33	3 4 13	3 9 58	3 15 50
8	2 4 56	2 9 47	2 14 42	2 19 43	2 24 51	2 30 4	2 35 23	2 40 47	2 46 17	2 51 51	2 57 28	3 3 10	3 8 58	3 14 52	3 20 51
9	2 8 17	2 13 15	2 18 18	2 23 26	2 28 45	2 34 5	2 39 32	2 45 4	2 50 42	2 56 25	3 2 11	3 8 2	3 13 59	3 20 1	3 26 7
10	2 11 52	2 16 58	2 22 10	2 27 24	2 32 54	2 38 23	2 43 59	2 49 38	2 55 23	3 1 13	3 7 9	3 13 10	3 19 17	3 25 26	3 31 38
11	2 15 38	2 20 53	2 26 15	2 31 43	2 37 17	2 42 55	2 48 39	2 54 28	3 0 22	3 6 22	3 12 27	3 18 37	3 24 51	3 31 11	3 37 37
12	2 19 40	2 25 4	2 30 35	2 36 13	2 41 58	2 47 46	2 53 38	2 59 37	3 5 42	3 11 51	3 18 5	3 24 25	3 30 51	3 36 22	3 44 0
13	2 24 0	2 29 35	2 35 17	2 41 4	2 46 56	2 52 54	2 58 58	3 5 7	3 11 21	3 17 41	3 24 7	3 30 37	3 37 12	3 43 56	3 50 40
14	2 28 39	2 34 24	2 40 14	2 46 11	2 52 14	2 58 23	3 4 39	3 11 0	3 17 26	3 23 58	3 30 35	3 37 17	3 44 3	3 50 56	3 57 56
15	2 33 39	2 39 36	2 45 38	2 51 47	2 58 4	3 4 24	3 10 48	3 17 18	3 23 57	3 30 50	3 37 29	3 44 22	3 51 20	3 58 24	4 5 36
16	2 39 6	2 45 13	2 51 27	2 57 48	3 4 17	3 10 50	3 17 26	3 24 9	3 30 59	3 37 54	3 44 55	3 52 1	3 59 12	4 6 28	4 13 50
17	2 44 58	2 51 19	2 57 45	3 4 17	3 10 56	3 17 42	3 24 34	3 31 31	3 38 33	3 45 41	3 52 54	4 0 13	4 7 37	4 15 7	4 22 42
18	2 51 20	2 57 54	3 4 34	3 11 20	3 18 13	3 25 12	3 32 18	3 39 29	3 46 44	3 54 5	4 1 33	4 9 4	4 16 40	4 24 22	4 32 10
19	2 58 15	3 5 3	3 11 58	3 18 59	3 26 7	3 33 21	3 40 42	3 48 8	3 55 38	4 3 14	4 10 56	4 18 42	4 26 34	4 34 31	4 42 32
20	3 5 53	3 12 57	3 20 7	3 27 23	3 34 44	3 42 13	3 49 51	3 57 33	4 5 18	4 13 8	4 21 4	4 29 7	4 37 17	4 45 20	4 53 47
21	3 14 14	3 21 35	3 29 1	3 36 33	3 44 12	3 51 58	3 59 52	4 7 49	4 15 49	4 23 56	4 32 11	4 40 30	4 48 53	4 57 21	5 5 54
22	3 23 27	3 31 5	3 38 51	3 46 42	3 54 37	4 2 40	4 10 51	4 19 6	4 27 25	4 35 50	4 44 21	4 52 55	5 1 34	5 10 18	5 19 8
23	3 33 43	3 41 41	3 49 45	3 57 54	4 6 9	4 14 30	4 22 57	4 31 30	4 40 9	4 48 52	4 57 40	5 6 33	5 15 32	5 24 35	5 33 43

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 43 48	1 47 49	1 51 54	1 56 4	2 0 18	2 4 38	2 9 1	2 13 30	2 18 3	2 22 44	2 27 26	2 32 9	2 37 0	2 41 56	2 46 55
1	1 41 43	1 45 39	1 49 40	1 53 46	1 57 56	2 2 11	2 6 28	2 10 53	2 15 21	2 19 55	2 24 33	2 29 12	2 33 58	2 38 47	2 43 39
2	1 39 43	1 43 34	1 47 30	1 51 32	1 55 37	1 59 47	2 4 0	2 8 20	2 12 43	2 17 11	2 21 44	2 26 19	2 31 0	2 35 42	2 40 28
3	1 37 47	1 41 33	1 45 24	1 49 22	1 53 22	1 57 27	2 1 35	2 5 50	2 10 8	2 14 31	2 18 59	2 23 30	2 28 5	2 32 42	2 37 22
4	1 35 55	1 39 36	1 43 22	1 47 16	1 51 11	1 55 11	1 59 14	2 3 24	2 7 37	2 11 55	2 16 18	2 20 44	2 25 14	2 29 46	2 34 21
5	1 34 7	1 37 43	1 41 24	1 45 14	1 49 4	1 52 59	1 56 57	2 1 2	2 5 10	2 9 23	2 13 41	2 18 2	2 22 27	2 26 54	2 31 24
6	1 32 22	1 35 54	1 39 31	1 43 16	1 47 1	1 50 51	1 54 44	1 58 44	2 2 47	2 6 55	2 11 8	2 15 24	2 19 44	2 24 6	2 28 31
7	1 30 40	1 34 8	1 37 41	1 41 21	1 45 2	1 48 47	1 52 35	1 56 30	2 0 28	2 4 31	2 8 39	2 12 50	2 17 5	2 21 22	2 25 42
8	1 29 1	1 32 25	1 35 54	1 39 29	1 43 6	1 46 47	1 50 30	1 54 20	1 58 13	2 2 11	2 6 14	2 10 20	2 14 30	2 18 42	2 22 57
9	1 27 25	1 30 45	1 34 10	1 37 40	1 41 13	1 44 50	1 48 29	1 52 14	1 56 2	1 59 55	2 3 53	2 7 54	2 11 59	2 16 6	2 20 16
10	1 25 52	1 29 8	1 32 29	1 35 54	1 39 23	1 42 56	1 46 32	1 50 12	1 53 55	1 57 43	2 1 36	2 5 32	2 9 32	2 13 34	2 17 39
11	1 24 22	1 27 34	1 30 51	1 34 12	1 37 37	1 41 5	1 44 39	1 48 14	1 51 53	1 55 36	1 59 24	2 3 15	2 7 10	2 11 9	2 15 9
12	1 22 54	1 26 3	1 29 16	1 32 34	1 35 55	1 39 18	1 42 49	1 46 20	1 49 55	1 53 33	1 57 17	2 1 3	2 4 53	2 8 49	2 12 44
13	1 21 29	1 24 35	1 27 45	1 30 59	1 34 16	1 37 35	1 41 2	1 44 29	1 48 0	1 51 33	1 55 14	1 58 56	2 2 41	2 6 34	2 10 24
14	1 20 7	1 23 9	1 26 16	1 29 26	1 32 39	1 35 55	1 39 18	1 42 41	1 46 8	1 49 37	1 53 15	1 56 53	2 0 34	2 4 24	2 8 10
15	1 18 47	1 21 46	1 24 50	1 27 56	1 31 5	1 34 18	1 37 37	1 40 57	1 44 20	1 47 45	1 51 20	1 54 54	1 58 31	2 2 17	2 5 59
16	1 17 29	1 20 25	1 23 26	1 26 29	1 29 34	1 32 44	1 35 59	1 39 16	1 42 35	1 45 57	1 49 29	1 52 59	1 56 32	2 0 14	2 3 53
17	1 16 13	1 19 6	1 22 4	1 25 4	1 28 6	1 31 13	1 34 24	1 37 38	1 40 54	1 44 13	1 47 49	1 51 7	1 54 36	1 58 15	2 1 51
18	1 14 59	1 17 49	1 20 44	1 23 41	1 26 40	1 29 44	1 32 52	1 36 3	1 39 16	1 42 32	1 45 54	1 49 18	1 52 44	1 56 19	1 59 52
19	1 13 47	1 16 34	1 19 26	1 22 20	1 25 16	1 28 17	1 31 22	1 34 30	1 37 40	1 40 53	1 44 11	1 47 32	1 50 56	1 54 26	1 57 56
20	1 12 37	1 15 21	1 18 10	1 21 1	1 23 54	1 26 52	1 29 54	1 32 59	1 36 6	1 39 16	1 42 31	1 45 49	1 49 11	1 52 36	1 56 3
21	1 11 29	1 14 10	1 16 56	1 19 44	1 22 34	1 25 29	1 28 28	1 31 30	1 34 34	1 37 41	1 40 53	1 44 8	1 47 26	1 50 47	1 54 11
22	1 10 22	1 13 0	1 15 43	1 18 28	1 21 16	1 24 8	1 27 3	1 30 2	1 33 3	1 36 7	1 39 16	1 42 27	1 45 42	1 48 59	1 52 20
23	1 9 15	1 11 51	1 14 30	1 17 12	1 19 58	1 22 47	1 25 39	1 28 34	1 31 32	1 34 34	1 37 39	1 40 47	1 43 58	1 47 12	1 50 29

LATITUDE 37° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 37	0 10 45	0 10 58	0 11 16	0 11 39	0 12 9	0 12 42	0 13 21	0 14 5	0 14 55	0 15 49	0 16 49	0 17 54	0 19 4	0 20 20
1	0 10 39	0 10 47	0 10 59	0 11 18	0 11 42	0 12 13	0 12 46	0 13 25	0 14 10	0 15 1	0 15 56	0 16 58	0 18 3	0 19 15	0 20 33
2	0 10 41	0 10 48	0 11 0	0 11 20	0 11 45	0 12 17	0 12 50	0 13 30	0 14 16	0 15 7	0 16 4	0 17 7	0 18 13	0 19 27	0 20 46
3	0 10 43	0 10 50	0 11 2	0 11 22	0 11 48	0 12 21	0 12 54	0 13 35	0 14 22	0 15 14	0 16 12	0 17 17	0 18 24	0 19 40	0 21 0
4	0 10 44	0 10 51	0 11 4	0 11 24	0 11 51	0 12 25	0 12 58	0 13 40	0 14 28	0 15 21	0 16 21	0 17 28	0 18 36	0 19 54	0 21 15
5	0 10 45	0 10 53	0 11 6	0 11 26	0 11 54	0 12 29	0 13 3	0 13 46	0 14 35	0 15 29	0 16 31	0 17 40	0 18 49	0 20 9	0 21 32
6	0 10 46	0 10 54	0 11 8	0 11 28	0 11 57	0 12 33	0 13 8	0 13 52	0 14 43	0 15 38	0 16 42	0 17 53	0 19 4	0 20 25	0 21 51
7	0 10 47	0 10 56	0 11 10	0 11 30	0 12 0	0 12 37	0 13 13	0 13 59	0 14 51	0 15 48	0 16 54	0 18 7	0 19 20	0 20 43	0 22 12
8	0 10 48	0 10 57	0 11 12	0 11 33	0 12 3	0 12 41	0 13 19	0 14 6	0 15 0	0 15 59	0 17 7	0 18 22	0 19 38	0 21 4	0 22 35
9	0 10 49	0 10 59	0 11 14	0 11 36	0 12 7	0 12 45	0 13 25	0 14 14	0 15 10	0 16 11	0 17 21	0 18 38	0 19 57	0 21 25	0 23 0
10	0 10 50	0 11 0	0 11 16	0 11 39	0 12 11	0 12 49	0 13 31	0 14 22	0 15 20	0 16 24	0 17 36	0 18 55	0 20 18	0 21 50	0 23 28
11	0 10 51	0 11 1	0 11 18	0 11 42	0 12 16	0 12 54	0 13 38	0 14 31	0 15 31	0 16 38	0 17 53	0 19 14	0 20 40	0 22 15	0 23 56
12	0 10 52	0 11 2	0 11 20	0 11 45	0 12 21	0 12 59	0 13 45	0 14 40	0 15 42	0 16 52	0 18 10	0 19 34	0 21 3	0 22 41	0 24 25
13	0 10 53	0 11 4	0 11 22	0 11 49	0 12 26	0 13 5	0 13 53	0 14 50	0 15 54	0 17 7	0 18 28	0 19 55	0 21 27	0 23 8	0 24 56
14	0 10 54	0 11 6	0 11 24	0 11 53	0 12 31	0 13 11	0 14 1	0 15 0	0 16 6	0 17 22	0 18 47	0 20 17	0 21 52	0 23 37	0 25 29
15	0 10 55	0 11 8	0 11 26	0 11 57	0 12 36	0 13 18	0 14 10	0 15 11	0 16 19	0 17 38	0 19 7	0 20 40	0 22 19	0 24 8	0 26 4
16	0 10 56	0 11 10	0 11 29	0 12 1	0 12 42	0 13 25	0 14 19	0 15 22	0 16 33	0 17 55	0 19 28	0 21 4	0 22 47	0 24 41	0 26 41
17	0 10 58	0 11 12	0 11 32	0 12 5	0 12 48	0 13 33	0 14 29	0 15 34	0 16 48	0 18 14	0 19 50	0 21 29	0 23 17	0 25 16	0 27 21
18	0 11 0	0 11 14	0 11 35	0 12 9	0 12 54	0 13 41	0 14 40	0 15 48	0 17 5	0 18 35	0 20 13	0 21 56	0 23 49	0 25 54	0 28 4
19	0 11 2	0 11 16	0 11 38	0 12 13	0 13 0	0 13 50	0 14 52	0 16 3	0 17 23	0 18 57	0 20 38	0 22 26	0 24 24	0 26 35	0 28 51
20	0 11 4	0 11 18	0 11 41	0 12 17	0 13 6	0 14 0	0 15 5	0 16 19	0 17 42	0 19 21	0 21 6	0 22 59	0 25 3	0 27 20	0 29 42
21	0 11 6	0 11 20	0 11 44	0 12 22	0 13 13	0 14 10	0 15 19	0 16 37	0 18 4	0 19 47	0 21 37	0 23 37	0 25 47	0 28 10	0 30 40
22	0 11 7	0 11 22	0 11 47	0 12 28	0 13 21	0 14 21	0 15 34	0 16 57	0 18 29	0 20 17	0 22 13	0 24 21	0 26 38	0 29 8	0 31 47
23	0 11 8	0 11 24	0 11 51	0 12 34	0 13 29	0 14 33	0 15 49	0 17 19	0 18 57	0 20 52	0 22 54	0 25 12	0 27 37	0 30 16	0 33 7

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 37	0 10 45	0 10 58	0 11 16	0 11 39	0 12 9	0 12 42	0 13 21	0 14 5	0 14 55	0 15 49	0 16 49	0 17 54	0 19 4	0 20 20
1	0 10 36	0 10 43	0 10 56	0 11 14	0 11 36	0 12 6	0 12 37	0 13 17	0 13 59	0 14 48	0 15 41	0 16 40	0 17 44	0 18 52	0 20 7
2	0 10 35	0 10 41	0 10 54	0 11 12	0 11 33	0 12 3	0 12 32	0 13 12	0 13 53	0 14 41	0 15 33	0 16 31	0 17 34	0 18 40	0 19 54
3	0 10 33	0 10 39	0 10 52	0 11 10	0 11 30	0 12 0	0 12 28	0 13 7	0 13 47	0 14 34	0 15 25	0 16 22	0 17 24	0 18 28	0 19 41
4	0 10 31	0 10 37	0 10 50	0 11 8	0 11 27	0 11 57	0 12 24	0 13 2	0 13 41	0 14 27	0 15 17	0 16 13	0 17 14	0 18 17	0 19 28
5	0 10 29	0 10 35	0 10 48	0 11 5	0 11 24	0 11 53	0 12 20	0 12 57	0 13 35	0 14 20	0 15 9	0 16 4	0 17 4	0 18 6	0 19 15
6	0 10 27	0 10 33	0 10 46	0 11 2	0 11 21	0 11 49	0 12 16	0 12 52	0 13 29	0 14 13	0 15 1	0 15 55	0 16 54	0 17 55	0 19 2
7	0 10 25	0 10 31	0 10 44	0 10 59	0 11 18	0 11 45	0 12 12	0 12 47	0 13 23	0 14 6	0 14 53	0 15 46	0 16 44	0 17 44	0 18 49
8	0 10 23	0 10 29	0 10 42	0 10 56	0 11 15	0 11 41	0 12 8	0 12 42	0 13 18	0 14 0	0 14 46	0 15 37	0 16 34	0 17 33	0 18 36
9	0 10 21	0 10 27	0 10 39	0 10 53	0 11 12	0 11 37	0 12 4	0 12 37	0 13 13	0 13 54	0 14 39	0 15 29	0 16 24	0 17 22	0 18 24
10	0 10 19	0 10 25	0 10 36	0 10 50	0 11 9	0 11 33	0 12 0	0 12 32	0 13 8	0 13 48	0 14 32	0 15 21	0 16 14	0 17 11	0 18 12
11	0 10 16	0 10 22	0 10 33	0 10 47	0 11 6	0 11 29	0 11 56	0 12 27	0 13 3	0 13 42	0 14 25	0 15 13	0 16 5	0 17 1	0 18 1
12	0 10 13	0 10 19	0 10 30	0 10 44	0 11 3	0 11 25	0 11 52	0 12 22	0 12 58	0 13 36	0 14 18	0 15 5	0 15 56	0 16 51	0 17 50
13	0 10 10	0 10 16	0 10 27	0 10 41	0 10 59	0 11 21	0 11 48	0 12 17	0 12 52	0 13 30	0 14 11	0 14 57	0 15 47	0 16 41	0 17 39
14	0 10 7	0 10 13	0 10 24	0 10 38	0 10 55	0 11 17	0 11 44	0 12 12	0 12 46	0 13 24	0 14 4	0 14 49	0 15 38	0 16 31	0 17 27
15	0 10 4	0 10 10	0 10 21	0 10 35	0 10 51	0 11 13	0 11 39	0 12 7	0 12 40	0 13 18	0 13 57	0 14 41	0 15 29	0 16 21	0 17 16
16	0 10 1	0 10 7	0 10 18	0 10 32	0 10 47	0 11 9	0 11 34	0 12 2	0 12 34	0 13 11	0 13 50	0 14 33	0 15 20	0 16 11	0 17 5
17	0 9 58	0 10 4	0 10 15	0 10 28	0 10 43	0 11 5	0 11 29	0 11 57	0 12 28	0 13 4	0 13 43	0 14 25	0 15 11	0 16 1	0 16 54
18	0 9 55	0 10 1	0 10 11	0 10 24	0 10 39	0 11 1	0 11 24	0 11 52	0 12 22	0 12 57	0 13 36	0 14 17	0 15 2	0 15 51	0 16 43
19	0 9 52	0 9 58	0 10 7	0 10 20	0 10 35	0 10 56	0 11 19	0 11 46	0 12 16	0 12 50	0 13 28	0 14 9	0 14 53	0 15 41	0 16 33
20	0 9 49	0 9 55	0 10 3	0 10 16	0 10 31	0 10 51	0 11 14	0 11 40	0 12 10	0 12 43	0 13 20	0 14 1	0 14 45	0 15 32	0 16 23
21	0 9 45	0 9 51	0 9 59	0 10 12	0 10 27	0 10 46	0 11 9	0 11 34	0 12 4	0 12 36	0 13 13	0 13 52	0 14 36	0 15 22	0 16 12
22	0 9 41	0 9 47	0 9 55	0 10 7	0 10 22	0 10 41	0 11 3	0 11 28	0 11 58	0 12 29	0 13 5	0 13 44	0 14 27	0 15 12	0 16 1
23	0 9 37	0 9 42	0 9 51	0 10 2	0 10 17	0 10 36	0 10 57	0 11 22	0 11 51	0 12 22	0 12 57	0 13 36	0 14 17	0 15 2	0 15 50

LATITUDE 37° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 21 40	0 23 5	0 24 36	0 26 12	0 27 53	0 29 39	0 31 30	0 33 26	0 35 27	0 37 33	0 39 45	0 42 1	0 44 21	0 46 48	0 49 19
1	0 21 54	0 23 22	0 24 55	0 26 34	0 28 17	0 30 5	0 31 59	0 33 58	0 36 2	0 38 11	0 40 26	0 42 45	0 45 9	0 47 40	0 50 13
2	0 22 9	0 23 40	0 25 15	0 26 57	0 28 42	0 30 32	0 32 29	0 34 31	0 36 38	0 38 50	0 41 8	0 43 31	0 45 59	0 48 34	0 51 10
3	0 22 25	0 23 59	0 25 36	0 27 21	0 29 8	0 31 0	0 33 0	0 35 5	0 37 15	0 39 30	0 41 52	0 44 19	0 46 51	0 49 30	0 52 9
4	0 22 43	0 24 20	0 25 59	0 27 47	0 29 36	0 31 30	0 33 33	0 35 41	0 37 54	0 40 13	0 42 39	0 45 10	0 47 46	0 50 29	0 53 16
5	0 23 3	0 24 43	0 26 24	0 28 15	0 30 6	0 32 3	0 34 9	0 36 20	0 38 36	0 40 59	0 43 29	0 46 4	0 48 44	0 51 31	0 54 26
6	0 23 25	0 25 8	0 26 51	0 28 45	0 30 39	0 32 39	0 34 48	0 37 2	0 39 22	0 41 49	0 44 23	0 47 2	0 49 46	0 52 37	0 55 37
7	0 23 49	0 25 34	0 27 20	0 29 17	0 31 14	0 33 18	0 35 30	0 37 48	0 40 12	0 42 43	0 45 21	0 48 4	0 50 52	0 53 47	0 56 51
8	0 24 15	0 26 2	0 27 51	0 29 51	0 31 52	0 34 0	0 36 16	0 38 38	0 41 6	0 43 41	0 46 23	0 49 10	0 52 2	0 55 1	0 58 8
9	0 24 43	0 26 32	0 28 25	0 30 28	0 32 33	0 34 45	0 37 5	0 39 32	0 42 4	0 44 43	0 47 29	0 50 20	0 53 17	0 56 20	0 59 31
10	0 25 13	0 27 4	0 29 1	0 31 7	0 33 17	0 35 33	0 37 58	0 40 30	0 43 6	0 45 49	0 48 39	0 51 34	0 54 36	0 57 45	1 1 1
11	0 25 44	0 27 39	0 29 40	0 31 50	0 34 5	0 36 24	0 38 54	0 41 31	0 44 12	0 47 0	0 49 55	0 52 55	0 56 3	0 59 18	1 2 38
12	0 26 17	0 28 16	0 30 21	0 32 35	0 34 56	0 37 19	0 39 54	0 42 36	0 45 22	0 48 15	0 51 16	0 54 21	0 57 35	1 0 56	1 4 20
13	0 26 52	0 28 55	0 31 4	0 33 23	0 35 50	0 38 18	0 40 58	0 43 45	0 46 36	0 49 35	0 52 42	0 55 53	0 59 13	1 2 40	1 6 9
14	0 27 29	0 29 36	0 31 50	0 34 14	0 36 47	0 39 21	0 42 6	0 44 58	0 47 55	0 51 0	0 54 14	0 57 32	1 0 58	1 4 31	1 8 5
15	0 28 8	0 30 20	0 32 39	0 35 8	0 37 47	0 40 27	0 43 18	0 46 15	0 49 19	0 52 31	0 55 52	0 59 17	1 2 50	1 6 31	1 10 13
16	0 28 50	0 31 7	0 33 31	0 36 5	0 38 50	0 41 36	0 44 34	0 47 38	0 50 49	0 54 8	0 57 36	1 1 9	1 4 51	1 8 41	1 12 28
17	0 29 35	0 31 57	0 34 27	0 37 7	0 39 58	0 42 51	0 45 56	0 49 7	0 52 26	0 55 53	0 59 29	1 3 11	1 7 3	1 11 2	1 14 59
18	0 30 24	0 32 51	0 35 28	0 38 15	0 41 12	0 44 13	0 47 25	0 50 44	0 54 12	0 57 48	1 1 32	1 5 24	1 9 26	1 13 35	1 17 40
19	0 31 17	0 33 50	0 36 34	0 39 29	0 42 33	0 45 43	0 49 2	0 52 30	0 56 8	0 59 53	1 3 47	1 7 49	1 12 1	1 16 20	1 20 39
20	0 32 15	0 34 56	0 37 48	0 40 51	0 44 3	0 47 22	0 50 49	0 54 27	0 58 16	1 2 11	1 6 15	1 10 27	1 14 49	1 19 18	1 23 55
21	0 33 20	0 36 10	0 39 11	0 42 24	0 45 45	0 49 14	0 52 52	0 56 41	1 0 41	1 4 46	1 9 1	1 13 25	1 17 59	1 22 41	1 27 34
22	0 34 36	0 37 36	0 40 46	0 44 9	0 47 40	0 51 21	0 55 11	0 59 12	1 3 24	1 7 41	1 12 9	1 16 47	1 21 35	1 26 31	1 31 38
23	0 36 6	0 39 16	0 42 36	0 46 10	0 49 51	0 53 45	0 57 49	1 2 3	1 6 29	1 10 59	1 15 41	1 20 34	1 25 37	1 30 49	1 36 9

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 21 40	0 23 5	0 24 36	0 26 12	0 27 52	0 29 39	0 31 30	0 33 26	0 35 27	0 37 33	0 39 45	0 42 1	0 44 21	0 46 48	0 49 19
1	0 21 25	0 22 49	0 24 17	0 25 51	0 27 29	0 29 14	0 31 3	0 32 56	0 34 54	0 36 57	0 39 5	0 41 17	0 43 33	0 45 56	0 48 23
2	0 21 10	0 22 33	0 23 58	0 25 30	0 27 6	0 28 49	0 30 36	0 32 27	0 34 22	0 36 22	0 38 27	0 40 35	0 42 47	0 45 7	0 47 30
3	0 20 55	0 22 17	0 23 40	0 25 10	0 26 44	0 28 25	0 30 9	0 31 58	0 33 50	0 35 48	0 37 50	0 39 55	0 42 4	0 44 21	0 46 40
4	0 20 40	0 22 1	0 23 22	0 24 50	0 26 22	0 28 1	0 29 43	0 31 29	0 33 19	0 35 15	0 37 14	0 39 16	0 41 23	0 43 37	0 45 53
5	0 20 25	0 21 45	0 23 4	0 24 30	0 26 0	0 27 37	0 29 17	0 31 1	0 32 49	0 34 42	0 36 39	0 38 39	0 40 44	0 42 55	0 45 8
6	0 20 11	0 21 29	0 22 47	0 24 11	0 25 39	0 27 14	0 28 52	0 30 34	0 32 20	0 34 10	0 36 5	0 38 3	0 40 6	0 42 14	0 44 25
7	0 19 57	0 21 13	0 22 30	0 23 52	0 25 18	0 26 51	0 28 27	0 30 7	0 31 51	0 33 39	0 35 32	0 37 28	0 39 29	0 41 35	0 43 44
8	0 19 43	0 20 57	0 22 13	0 23 34	0 24 58	0 26 29	0 28 3	0 29 41	0 31 23	0 33 9	0 35 0	0 36 54	0 38 53	0 40 57	0 43 4
9	0 19 30	0 20 42	0 21 57	0 23 16	0 24 39	0 26 8	0 27 40	0 29 16	0 30 56	0 32 40	0 34 29	0 36 21	0 38 18	0 40 20	0 42 25
10	0 19 17	0 20 27	0 21 41	0 22 59	0 24 21	0 25 48	0 27 18	0 28 52	0 30 30	0 32 12	0 33 59	0 35 49	0 37 44	0 39 44	0 41 47
11	0 19 5	0 20 13	0 21 26	0 22 43	0 24 3	0 25 29	0 26 57	0 28 29	0 30 5	0 31 45	0 33 30	0 35 18	0 37 11	0 39 9	0 41 10
12	0 18 53	0 19 59	0 21 11	0 22 27	0 23 46	0 25 10	0 26 36	0 28 6	0 29 40	0 31 19	0 33 2	0 34 48	0 36 39	0 38 35	0 40 34
13	0 18 41	0 19 46	0 20 56	0 22 11	0 23 29	0 24 51	0 26 15	0 27 43	0 29 16	0 30 53	0 32 34	0 34 19	0 36 8	0 38 1	0 39 58
14	0 18 29	0 19 33	0 20 41	0 21 55	0 23 12	0 24 32	0 25 55	0 27 21	0 28 53	0 30 28	0 32 7	0 33 51	0 35 37	0 37 28	0 39 23
15	0 18 17	0 19 20	0 20 27	0 21 39	0 22 55	0 24 13	0 25 35	0 26 59	0 28 30	0 30 3	0 31 41	0 33 23	0 35 7	0 36 56	0 38 48
16	0 18 5	0 19 7	0 20 13	0 21 23	0 22 38	0 23 54	0 25 15	0 26 38	0 28 7	0 29 39	0 31 15	0 32 56	0 34 37	0 36 24	0 38 14
17	0 17 53	0 18 54	0 19 59	0 21 7	0 22 21	0 23 36	0 24 55	0 26 17	0 27 45	0 29 15	0 30 50	0 32 29	0 34 8	0 35 53	0 37 41
18	0 17 41	0 18 41	0 19 45	0 20 52	0 22 4	0 23 18	0 24 36	0 25 57	0 27 23	0 28 51	0 30 25	0 32 2	0 33 39	0 35 22	0 37 8
19	0 17 29	0 18 28	0 19 31	0 20 37	0 21 47	0 23 0	0 24 17	0 25 37	0 27 1	0 28 28	0 30 0	0 31 35	0 33 11	0 34 52	0 36 36
20	0 17 17	0 18 15	0 19 17	0 20 22	0 21 30	0 22 42	0 23 58	0 25 17	0 26 39	0 28 5	0 29 35	0 31 8	0 32 43	0 34 22	0 36 4
21	0 17 5	0 18 2	0 19 3	0 20 7	0 21 14	0 22 24	0 23 39	0 24 57	0 26 17	0 27 42	0 29 10	0 30 42	0 32 15	0 33 53	0 35 33
22	0 16 53	0 17 49	0 18 49	0 19 52	0 20 58	0 22 7	0 23 20	0 24 37	0 25 56	0 27 19	0 28 45	0 30 16	0 31 48	0 33 24	0 35 3
23	0 16 42	0 17 37	0 18 35	0 19 37	0 20 42	0 21 50	0 23 2	0 24 17	0 25 35	0 26 57	0 28 21	0 29 50	0 31 21	0 32 56	0 34 33

LATITUDE 37° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 51 55	0 54 36	0 57 22	1 0 13	1 3 8	1 6 9	1 9 14	1 12 24	1 15 40	1 19 0	1 22 24	1 25 53	1 29 26	1 33 5	1 36 49
1	0 52 54	0 55 40	0 58 30	1 1 24	1 4 23	1 7 28	1 10 38	1 13 52	1 17 12	1 20 36	1 24 5	1 27 39	1 31 17	1 35 1	1 38 50
2	0 53 55	0 56 46	0 59 41	1 2 38	1 5 41	1 8 51	1 12 5	1 15 24	1 18 48	1 22 16	1 25 50	1 29 28	1 33 12	1 37 1	1 40 55
3	0 54 59	0 57 55	1 0 54	1 3 55	1 7 3	1 10 17	1 13 36	1 16 59	1 20 27	1 24 0	1 27 39	1 31 22	1 35 11	1 39 5	1 43 4
4	0 56 9	0 59 7	1 2 10	1 5 17	1 8 29	1 11 47	1 15 10	1 18 38	1 22 12	1 25 50	1 29 34	1 33 22	1 37 17	1 41 16	1 45 20
5	0 57 23	1 0 23	1 3 30	1 6 43	1 10 0	1 13 21	1 16 48	1 20 22	1 24 2	1 27 46	1 31 36	1 35 30	1 39 29	1 43 33	1 47 43
6	0 58 39	1 1 44	1 4 55	1 8 13	1 11 35	1 15 0	1 18 33	1 22 12	1 25 57	1 29 47	1 33 42	1 37 42	1 41 47	1 45 57	1 50 13
7	0 59 57	1 3 7	1 6 23	1 9 46	1 13 14	1 16 45	1 20 23	1 24 8	1 27 58	1 31 54	1 35 55	1 40 1	1 44 12	1 48 28	1 52 50
8	1 1 18	1 4 33	1 7 54	1 11 23	1 14 57	1 18 35	1 22 19	1 26 10	1 30 6	1 34 8	1 38 15	1 42 27	1 46 45	1 51 8	1 55 37
9	1 2 47	1 6 6	1 9 33	1 13 6	1 16 46	1 20 32	1 24 22	1 28 19	1 32 22	1 36 30	1 40 44	1 45 3	1 49 28	1 53 58	1 58 34
10	1 4 25	1 7 48	1 11 21	1 14 59	1 18 44	1 22 36	1 26 33	1 30 36	1 34 45	1 39 1	1 43 23	1 47 50	1 52 22	1 56 59	2 1 42
11	1 6 7	1 9 37	1 13 17	1 17 2	1 20 52	1 24 50	1 28 54	1 33 4	1 37 20	1 41 43	1 46 12	1 50 48	1 55 28	2 0 13	2 5 3
12	1 7 55	1 11 33	1 15 20	1 19 12	1 23 9	1 27 13	1 31 25	1 35 43	1 40 7	1 44 37	1 49 14	1 53 58	1 58 46	2 3 39	2 8 38
13	1 9 49	1 13 35	1 17 29	1 21 30	1 25 36	1 29 47	1 34 7	1 38 35	1 43 7	1 47 44	1 52 28	1 57 21	2 2 18	2 7 19	2 12 27
14	1 11 53	1 15 47	1 19 48	1 23 56	1 28 11	1 32 31	1 36 58	1 41 32	1 46 14	1 51 3	1 55 57	2 0 57	2 6 2	2 11 13	2 16 31
15	1 14 9	1 18 11	1 22 20	1 26 36	1 30 59	1 35 28	1 40 5	1 44 49	1 49 40	1 54 37	1 59 40	2 4 41	2 10 3	2 15 24	2 20 52
16	1 16 33	1 20 44	1 25 1	1 29 25	1 33 56	1 38 34	1 43 20	1 48 13	1 53 14	1 58 22	2 3 35	2 8 55	2 14 23	2 19 58	2 25 37
17	1 19 12	1 23 31	1 28 0	1 32 36	1 37 19	1 42 9	1 47 6	1 52 10	1 57 20	2 2 36	2 8 0	2 13 31	2 19 8	2 24 51	2 30 41
18	1 22 2	1 26 33	1 31 13	1 36 2	1 40 56	1 45 55	1 51 11	1 56 15	2 1 36	2 7 5	2 12 40	2 18 21	2 24 10	2 30 7	2 36 10
19	1 25 11	1 29 51	1 34 41	1 39 39	1 44 45	1 49 59	1 55 19	2 0 45	2 6 19	2 12 2	2 17 50	2 23 42	2 29 45	2 35 57	2 42 12
20	1 28 41	1 33 34	1 38 36	1 43 47	1 49 5	1 54 30	2 0 3	2 5 44	2 11 31	2 17 25	2 23 27	2 29 37	2 35 53	2 42 15	2 48 43
21	1 32 32	1 37 40	1 42 57	1 48 22	1 53 53	1 59 31	2 5 18	2 11 14	2 17 17	2 23 26	2 29 43	2 36 7	2 42 37	2 49 14	2 55 58
22	1 36 52	1 42 13	1 47 44	1 53 26	1 59 13	2 5 5	2 11 6	2 17 16	2 23 34	2 29 59	2 36 33	2 43 14	2 50 0	2 56 52	3 3 51
23	1 41 37	1 47 15	1 53 1	1 58 57	2 5 1	2 11 12	2 17 31	2 23 57	2 30 32	2 37 16	2 44 6	2 51 1	2 58 5	3 5 18	3 12 33

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 51 55	0 54 36	0 57 22	1 0 13	1 3 8	1 6 9	1 9 14	1 12 24	1 15 40	1 19 0	1 22 24	1 25 53	1 29 26	1 33 5	1 36 49
1	0 50 58	0 53 35	0 56 18	0 59 5	1 1 56	1 4 53	1 7 54	1 11 1	1 14 13	1 17 29	1 20 50	1 24 16	1 27 46	1 31 21	1 35 0
2	0 50 3	0 52 37	0 55 16	0 58 0	1 0 48	1 3 41	1 6 38	1 9 41	1 12 49	1 16 1	1 19 18	1 22 41	1 26 8	1 29 39	1 33 14
3	0 49 10	0 51 41	0 54 17	0 56 58	0 59 43	1 2 32	1 5 25	1 8 24	1 11 28	1 14 36	1 17 49	1 21 8	1 24 32	1 27 59	1 31 30
4	0 48 19	0 50 47	0 53 20	0 55 58	0 58 40	1 1 25	1 4 15	1 7 10	1 10 10	1 13 14	1 16 23	1 19 38	1 22 58	1 26 21	1 29 48
5	0 47 30	0 49 55	0 52 25	0 55 0	0 57 39	1 0 21	1 3 8	1 5 59	1 8 55	1 11 55	1 15 0	1 18 11	1 21 27	1 24 46	1 28 9
6	0 46 45	0 49 5	0 51 32	0 54 4	0 56 40	0 59 19	1 2 3	1 4 51	1 7 43	1 10 39	1 13 40	1 16 47	1 19 59	1 23 14	1 26 33
7	0 45 58	0 48 17	0 50 41	0 53 10	0 55 43	0 58 19	1 1 0	1 3 45	1 6 34	1 9 26	1 12 23	1 15 26	1 18 34	1 21 45	1 25 0
8	0 45 15	0 47 31	0 49 52	0 52 18	0 54 48	0 57 21	0 59 59	1 2 41	1 5 37	1 8 16	1 11 9	1 14 8	1 17 12	1 20 19	1 23 30
9	0 44 34	0 46 47	0 49 5	0 51 28	0 53 55	0 56 25	0 59 0	1 1 39	1 4 22	1 7 8	1 9 58	1 12 53	1 15 53	1 18 56	1 22 3
10	0 43 54	0 46 5	0 48 20	0 50 40	0 53 4	0 55 31	0 58 3	1 0 39	1 3 19	1 6 2	1 8 49	1 11 41	1 14 37	1 17 36	1 20 39
11	0 43 15	0 45 23	0 47 36	0 49 53	0 52 14	0 54 37	0 57 6	0 59 39	1 2 17	1 4 57	1 7 41	1 10 30	1 13 23	1 16 18	1 19 18
12	0 42 36	0 44 42	0 46 53	0 49 7	0 51 25	0 53 45	0 56 11	0 58 41	1 1 17	1 3 54	1 6 35	1 9 21	1 12 11	1 15 2	1 17 59
13	0 41 58	0 44 2	0 46 11	0 48 22	0 50 37	0 52 55	0 55 18	0 57 45	1 0 19	1 2 53	1 5 31	1 8 14	1 11 1	1 13 48	1 16 42
14	0 41 21	0 43 23	0 45 29	0 47 38	0 49 50	0 52 6	0 54 26	0 56 51	0 59 22	1 1 53	1 4 28	1 7 8	1 9 53	1 12 36	1 15 27
15	0 40 44	0 42 44	0 44 48	0 46 55	0 49 4	0 51 18	0 53 36	0 55 58	0 58 27	1 0 55	1 3 27	1 6 4	1 8 46	1 11 26	1 14 14
16	0 40 8	0 42 6	0 44 8	0 46 12	0 48 19	0 50 31	0 52 47	0 55 7	0 57 33	0 59 58	1 2 27	1 5 1	1 7 40	1 10 18	1 13 3
17	0 39 33	0 41 29	0 43 28	0 45 30	0 47 35	0 49 45	0 51 59	0 54 17	0 56 39	0 59 2	1 1 28	1 3 59	1 6 35	1 9 11	1 11 53
18	0 38 58	0 40 52	0 42 49	0 44 49	0 46 52	0 49 0	0 51 12	0 53 27	0 55 46	0 58 7	1 0 31	1 2 59	1 5 32	1 8 6	1 10 45
19	0 38 24	0 40 16	0 42 11	0 44 9	0 46 10	0 48 16	0 50 25	0 52 38	0 54 54	0 57 13	0 59 35	1 2 1	1 4 31	1 7 3	1 9 39
20	0 37 50	0 39 40	0 41 33	0 43 29	0 45 29	0 47 32	0 49 39	0 51 49	0 54 3	0 56 20	0 58 40	1 1 4	1 3 31	1 6 1	1 8 34
21	0 37 17	0 39 5	0 40 56	0 42 50	0 44 48	0 46 49	0 48 54	0 51 1	0 53 13	0 55 29	0 57 47	1 0 8	1 2 32	1 5 0	1 7 30
22	0 36 45	0 38 31	0 40 20	0 42 12	0 44 8	0 46 7	0 48 9	0 50 14	0 52 24	0 54 38	0 56 54	0 59 13	1 1 34	1 3 59	1 6 27
23	0 36 13	0 37 57	0 39 44	0 41 34	0 43 28	0 45 25	0 47 25	0 49 28	0 51 36	0 53 48	0 56 2	0 58 18	1 0 37	1 2 59	1 5 25

LATITUDE 37° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 40 36	1 44 29	1 48 26	1 52 28	1 56 34	2 0 45	2 5 0	2 9 20	2 13 43	2 18 12	2 22 45	2 27 22	2 32 4	2 36 50	2 41 40
1	1 42 42	1 46 40	1 50 42	1 54 49	1 59 0	2 3 17	2 7 37	2 12 3	2 16 32	2 21 6	2 25 44	2 30 27	2 35 15	2 40 7	2 35 3
2	1 44 52	1 48 55	1 53 3	1 57 15	2 1 32	2 5 54	2 10 20	2 14 51	2 19 26	2 24 6	2 28 50	2 33 39	2 38 33	2 43 31	2 38 33
3	1 47 7	1 51 15	1 55 28	1 59 46	2 4 9	2 8 36	2 13 8	2 17 45	2 22 26	2 27 12	2 32 2	2 36 57	2 41 57	2 47 1	2 52 10
4	1 49 28	1 53 42	1 58 1	2 2 25	2 6 54	2 11 27	2 16 5	2 20 48	2 25 35	2 30 27	2 35 24	2 40 25	2 45 32	2 50 42	2 55 57
5	1 51 57	1 56 17	2 0 43	2 5 13	2 9 48	2 14 28	2 19 12	2 24 1	2 28 58	2 33 53	2 38 56	2 44 4	2 49 18	2 54 36	2 59 58
6	1 54 34	1 59 0	2 3 32	2 8 8	2 12 50	2 17 36	2 22 27	2 27 23	2 32 24	2 37 29	2 42 39	2 47 54	2 53 15	2 58 41	3 4 11
7	1 57 19	2 1 52	2 6 30	2 11 13	2 16 2	2 20 55	2 25 52	2 30 56	2 36 4	2 41 17	2 46 34	2 51 56	2 57 24	3 2 57	3 8 35
8	2 0 13	2 4 53	2 9 38	2 14 28	2 19 24	2 24 24	2 29 29	2 34 40	2 39 56	2 45 17	2 50 42	2 56 12	3 1 47	3 7 27	3 13 13
9	2 3 17	2 8 4	2 12 56	2 17 54	2 22 57	2 28 5	2 33 17	2 38 35	2 44 0	2 49 29	2 55 2	3 0 41	3 6 24	3 12 11	3 18 4
10	2 6 31	2 11 25	2 16 25	2 21 31	2 26 42	2 31 58	2 37 18	2 42 44	2 48 17	2 53 54	2 59 36	3 5 23	3 11 14	3 17 9	3 23 9
11	2 9 59	2 15 0	2 20 8	2 25 22	2 30 41	2 36 6	2 41 35	2 47 10	2 52 51	2 58 37	3 4 28	3 10 23	3 16 22	3 22 26	3 28 35
12	2 13 42	2 18 51	2 24 8	2 29 31	2 34 58	2 40 32	2 46 11	2 51 55	2 57 44	3 3 39	3 9 39	3 15 44	3 21 52	3 28 6	3 34 25
13	2 17 40	2 23 0	2 28 27	2 33 59	2 39 36	2 45 19	2 51 8	2 57 1	3 2 59	3 9 3	3 15 13	3 21 28	3 27 48	3 34 12	3 40 41
14	2 21 55	2 27 25	2 33 0	2 38 41	2 44 29	2 50 21	2 56 18	3 2 22	3 8 33	3 14 48	3 21 7	3 27 31	3 34 0	3 40 35	3 47 17
15	2 26 28	2 32 8	2 37 52	2 43 43	2 49 41	2 55 45	3 1 55	3 8 9	3 14 28	3 20 53	3 27 23	3 33 58	3 40 39	3 47 25	3 54 15
16	2 31 20	2 37 10	2 43 6	2 49 8	2 55 16	3 1 29	3 7 49	3 14 15	3 20 48	3 27 26	3 34 8	3 40 54	3 47 45	3 54 44	4 1 49
17	2 36 38	2 43 45	2 48 47	2 55 1	3 1 23	3 7 50	3 14 22	3 20 59	3 27 40	3 34 28	3 41 24	3 48 24	3 55 27	4 2 35	4 9 47
18	2 42 19	2 48 34	2 54 54	3 1 21	3 7 55	3 14 34	3 21 19	3 28 10	3 35 6	3 42 7	3 49 12	3 56 24	4 3 44	4 10 7	4 18 34
19	2 48 31	2 54 57	3 1 31	3 8 11	3 14 58	3 21 52	3 28 52	3 35 55	3 43 3	3 50 17	3 57 37	4 5 3	4 12 37	4 20 15	4 27 56
20	2 55 17	3 1 59	3 8 48	3 15 42	3 22 41	3 29 49	3 37 3	3 44 22	3 51 45	3 59 14	4 6 49	4 14 29	4 22 13	4 30 3	4 37 59
21	3 2 48	3 9 44	3 16 45	3 23 55	3 31 13	3 38 35	3 46 1	3 53 35	4 1 15	4 8 58	4 16 45	4 24 39	4 32 40	4 40 46	4 48 57
22	3 10 57	3 18 10	3 25 31	3 32 58	3 40 30	3 48 8	3 55 52	4 3 41	4 11 34	4 19 33	4 27 39	4 35 50	4 44 7	4 52 27	5 0 50
23	3 19 53	3 27 22	3 35 0	3 42 45	3 50 36	3 58 33	4 6 35	4 14 41	4 22 51	4 31 7	4 39 30	4 47 58	4 56 30	5 5 7	5 13 49

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 40 36	1 44 29	1 48 26	1 52 28	1 56 34	2 0 45	2 5 0	2 9 20	2 13 43	2 18 12	2 22 45	2 27 22	2 32 4	2 36 50	2 41 40
1	1 38 43	1 42 31	1 46 24	1 50 20	1 54 20	1 58 26	2 2 36	2 6 51	2 11 9	2 15 33	2 20 1	2 24 34	2 29 11	2 33 52	2 38 36
2	1 36 53	1 40 36	1 44 24	1 48 15	1 52 11	1 56 12	2 0 17	2 4 27	2 8 40	2 12 59	2 17 22	2 21 50	2 26 22	2 30 58	2 35 36
3	1 35 5	1 38 44	1 42 27	1 46 14	1 50 6	1 54 2	1 58 2	2 2 7	2 6 15	2 10 29	2 14 47	2 19 10	2 23 37	2 28 8	2 32 41
4	1 33 19	1 36 54	1 40 33	1 44 16	1 48 4	1 51 55	1 55 50	1 59 51	2 3 54	2 8 3	2 12 16	2 16 34	2 20 56	2 25 22	2 29 50
5	1 31 36	1 35 7	1 38 42	1 42 21	1 46 5	1 49 52	1 53 42	1 57 38	2 1 36	2 5 41	2 9 49	2 14 2	2 18 19	2 22 40	2 27 3
6	1 29 56	1 33 23	1 36 54	1 40 29	1 44 9	1 47 52	1 51 37	1 55 28	1 59 22	2 3 23	2 7 26	2 11 34	2 15 46	2 20 2	2 24 20
7	1 28 19	1 31 42	1 35 9	1 38 40	1 42 16	1 45 55	1 49 36	1 53 22	1 57 12	2 1 9	2 5 7	2 9 10	2 13 17	2 17 28	2 21 41
8	1 26 45	1 30 4	1 33 27	1 36 54	1 40 26	1 44 1	1 47 38	1 51 20	1 55 6	1 58 58	2 2 52	2 6 50	2 10 52	2 14 58	2 19 6
9	1 25 14	1 28 29	1 31 48	1 35 11	1 38 39	1 42 10	1 45 43	1 49 21	1 53 3	1 56 50	2 0 40	2 4 34	2 8 31	2 12 32	2 16 35
10	1 23 46	1 26 57	1 30 12	1 33 31	1 36 55	1 40 22	1 43 51	1 47 25	1 51 3	1 54 45	1 58 31	2 2 21	2 6 14	2 10 10	2 14 8
11	1 22 21	1 25 28	1 28 39	1 31 54	1 35 14	1 38 37	1 42 2	1 45 32	1 49 6	1 52 44	1 56 26	2 0 12	2 4 1	2 7 53	2 11 47
12	1 20 58	1 24 2	1 27 9	1 30 20	1 33 36	1 36 55	1 40 16	1 43 43	1 47 13	1 50 47	1 54 25	1 58 7	2 1 52	2 5 40	2 9 30
13	1 19 38	1 22 39	1 25 42	1 28 49	1 32 1	1 35 17	1 38 34	1 41 58	1 45 24	1 48 54	1 52 28	1 56 6	1 59 47	2 3 31	2 7 17
14	1 18 20	1 21 18	1 24 18	1 27 21	1 30 29	1 33 42	1 36 56	1 40 17	1 43 39	1 47 5	1 50 35	1 54 9	1 57 46	2 1 26	2 5 8
15	1 17 4	1 19 59	1 22 56	1 25 55	1 29 0	1 32 10	1 35 21	1 38 39	1 41 58	1 45 20	1 48 46	1 52 16	1 55 49	1 59 25	2 3 3
16	1 15 50	1 18 42	1 21 36	1 24 32	1 27 34	1 30 41	1 33 49	1 37 4	1 40 20	1 43 38	1 47 1	1 50 27	1 53 56	1 57 28	2 1 3
17	1 14 38	1 17 27	1 20 18	1 23 11	1 26 10	1 29 15	1 32 20	1 35 32	1 38 44	1 41 58	1 45 18	1 48 41	1 52 6	1 55 35	1 59 7
18	1 13 28	1 16 14	1 19 2	1 21 53	1 24 49	1 27 51	1 30 53	1 34 2	1 37 10	1 40 21	1 43 38	1 46 58	1 50 19	1 53 45	1 57 14
19	1 12 19	1 15 2	1 17 48	1 20 37	1 23 30	1 26 29	1 29 28	1 32 34	1 35 38	1 38 46	1 42 0	1 45 17	1 48 35	1 51 58	1 55 24
20	1 11 11	1 13 51	1 16 35	1 19 22	1 22 13	1 25 8	1 28 4	1 31 7	1 34 7	1 37 14	1 40 24	1 43 37	1 46 54	1 50 14	1 53 37
21	1 10 5	1 12 42	1 15 23	1 18 8	1 20 56	1 23 47	1 26 41	1 29 40	1 32 38	1 35 42	1 38 49	1 41 59	1 45 12	1 48 29	1 51 49
22	1 8 59	1 11 34	1 14 12	1 16 54	1 19 39	1 22 27	1 25 18	1 28 14	1 31 10	1 34 10	1 37 14	1 40 21	1 43 31	1 46 44	1 50 1
23	1 7 54	1 10 26	1 13 2	1 15 41	1 18 22	1 21 7	1 23 56	1 26 48	1 29 42	1 32 39	1 35 40	1 38 44	1 41 50	1 45 0	1 48 13

LATITUDE 38° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 36	0 10 44	0 10 56	0 11 14	0 11 36	0 12 4	0 12 37	0 13 15	0 13 57	0 14 45	0 15 37	0 16 36	0 17 38	0 18 46	0 19 58
1	0 10 37	0 10 46	0 10 58	0 11 16	0 11 39	0 12 7	0 12 41	0 13 21	0 14 3	0 14 52	0 15 44	0 16 44	0 17 48	0 18 57	0 20 11
2	0 10 39	0 10 48	0 11 0	0 11 18	0 11 42	0 12 11	0 12 45	0 13 27	0 14 9	0 14 59	0 15 52	0 16 53	0 17 59	0 19 9	0 20 25
3	0 10 40	0 10 49	0 11 2	0 11 20	0 11 45	0 12 15	0 12 50	0 13 33	0 14 15	0 15 6	0 16 0	0 17 2	0 18 10	0 19 21	0 20 40
4	0 10 42	0 10 51	0 11 5	0 11 22	0 11 48	0 12 19	0 12 55	0 13 39	0 14 22	0 15 14	0 16 9	0 17 12	0 18 22	0 19 34	0 20 56
5	0 10 43	0 10 53	0 11 7	0 11 24	0 11 51	0 12 23	0 13 0	0 13 45	0 14 29	0 15 22	0 16 19	0 17 23	0 18 35	0 19 49	0 21 13
6	0 10 45	0 10 55	0 11 9	0 11 26	0 11 54	0 12 27	0 13 5	0 13 51	0 14 36	0 15 31	0 16 29	0 17 35	0 18 49	0 20 5	0 21 31
7	0 10 46	0 10 56	0 11 11	0 11 29	0 11 57	0 12 31	0 13 10	0 13 57	0 14 44	0 15 40	0 16 40	0 17 48	0 19 4	0 20 22	0 21 50
8	0 10 48	0 10 58	0 11 13	0 11 32	0 12 0	0 12 35	0 13 15	0 14 3	0 14 52	0 15 50	0 16 52	0 18 2	0 19 20	0 20 40	0 22 10
9	0 10 50	0 10 59	0 11 15	0 11 35	0 12 4	0 12 39	0 13 20	0 14 9	0 15 0	0 16 0	0 17 5	0 18 17	0 19 37	0 20 59	0 22 32
10	0 10 52	0 11 1	0 11 17	0 11 38	0 12 8	0 12 43	0 13 25	0 14 15	0 15 9	0 16 11	0 17 19	0 18 33	0 19 55	0 21 19	0 22 55
11	0 10 53	0 11 2	0 11 19	0 11 41	0 12 12	0 12 48	0 13 31	0 14 22	0 15 18	0 16 22	0 17 33	0 18 49	0 20 13	0 21 40	0 23 20
12	0 10 54	0 11 3	0 11 21	0 11 44	0 12 16	0 12 53	0 13 38	0 14 30	0 15 28	0 16 34	0 17 48	0 19 6	0 20 32	0 22 3	0 23 46
13	0 10 56	0 11 4	0 11 23	0 11 47	0 12 20	0 12 58	0 13 45	0 14 39	0 15 39	0 16 47	0 18 4	0 19 24	0 20 53	0 22 28	0 24 13
14	0 10 57	0 11 6	0 11 25	0 11 50	0 12 24	0 13 4	0 13 52	0 14 48	0 15 51	0 17 1	0 18 21	0 19 43	0 21 15	0 22 54	0 24 42
15	0 10 58	0 11 8	0 11 27	0 11 53	0 12 28	0 13 10	0 14 0	0 14 58	0 16 3	0 17 16	0 18 39	0 20 3	0 21 39	0 23 22	0 25 13
16	0 11 0	0 11 10	0 11 29	0 11 57	0 12 33	0 13 16	0 14 8	0 15 9	0 16 16	0 17 32	0 18 58	0 20 25	0 22 5	0 23 52	0 25 46
17	0 11 1	0 11 12	0 11 31	0 12 1	0 12 38	0 13 23	0 14 17	0 15 20	0 16 30	0 17 49	0 19 18	0 20 49	0 22 33	0 24 24	0 26 22
18	0 11 2	0 11 14	0 11 33	0 12 5	0 12 43	0 13 30	0 14 26	0 15 32	0 16 45	0 18 7	0 19 39	0 21 15	0 23 3	0 24 58	0 27 1
19	0 11 3	0 11 16	0 11 36	0 12 9	0 12 49	0 13 38	0 14 36	0 15 45	0 17 1	0 18 26	0 20 2	0 21 43	0 23 35	0 25 35	0 27 43
20	0 11 5	0 11 18	0 11 39	0 12 13	0 12 55	0 13 46	0 14 47	0 15 59	0 17 18	0 18 46	0 20 27	0 22 13	0 24 9	0 26 15	0 28 29
21	0 11 6	0 11 20	0 11 42	0 12 18	0 13 2	0 13 55	0 14 59	0 16 13	0 17 37	0 19 10	0 20 54	0 22 45	0 24 47	0 26 58	0 29 19
22	0 11 7	0 11 22	0 11 45	0 12 23	0 13 11	0 14 6	0 15 13	0 16 30	0 17 59	0 19 38	0 21 26	0 23 23	0 25 32	0 27 49	0 30 17
23	0 11 9	0 11 24	0 11 49	0 12 29	0 13 21	0 14 20	0 15 30	0 16 50	0 18 25	0 20 11	0 22 4	0 24 7	0 26 24	0 28 48	0 31 23

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 36	0 10 44	0 10 56	0 11 14	0 11 36	0 12 4	0 12 37	0 13 15	0 13 57	0 14 45	0 15 37	0 16 36	0 17 38	0 18 46	0 19 58
1	0 10 35	0 10 43	0 10 54	0 11 12	0 11 34	0 12 1	0 12 33	0 13 11	0 13 51	0 14 38	0 15 29	0 16 27	0 17 28	0 18 35	0 19 46
2	0 10 34	0 10 41	0 10 52	0 11 10	0 11 32	0 11 58	0 12 29	0 13 7	0 13 45	0 14 31	0 15 21	0 16 18	0 17 18	0 18 24	0 19 34
3	0 10 33	0 10 39	0 10 50	0 11 8	0 11 29	0 11 55	0 12 25	0 13 3	0 13 39	0 14 24	0 15 14	0 16 9	0 17 8	0 18 13	0 19 22
4	0 10 31	0 10 37	0 10 48	0 11 6	0 11 26	0 11 52	0 12 21	0 12 58	0 13 33	0 14 18	0 15 7	0 16 0	0 16 58	0 18 2	0 19 10
5	0 10 29	0 10 35	0 10 46	0 11 4	0 11 23	0 11 49	0 12 17	0 12 53	0 13 28	0 14 12	0 15 0	0 15 52	0 16 48	0 17 51	0 18 58
6	0 10 27	0 10 33	0 10 44	0 11 1	0 11 20	0 11 46	0 12 13	0 12 48	0 13 23	0 14 6	0 14 53	0 15 44	0 16 39	0 17 40	0 18 46
7	0 10 25	0 10 31	0 10 42	0 10 58	0 11 17	0 11 42	0 12 9	0 12 43	0 13 18	0 14 0	0 14 46	0 15 36	0 16 30	0 17 29	0 18 34
8	0 10 23	0 10 29	0 10 40	0 10 55	0 11 14	0 11 38	0 12 5	0 12 38	0 13 13	0 13 54	0 14 39	0 15 28	0 16 21	0 17 18	0 18 22
9	0 10 21	0 10 27	0 10 38	0 10 52	0 11 11	0 11 34	0 12 1	0 12 33	0 13 8	0 13 48	0 14 32	0 15 20	0 16 12	0 17 8	0 18 10
10	0 10 19	0 10 25	0 10 35	0 10 49	0 11 8	0 11 30	0 11 57	0 12 28	0 13 3	0 13 42	0 14 25	0 15 12	0 16 3	0 16 58	0 17 58
11	0 10 16	0 10 22	0 10 32	0 10 46	0 11 5	0 11 26	0 11 53	0 12 23	0 12 58	0 13 36	0 14 18	0 15 4	0 15 54	0 16 48	0 17 47
12	0 10 13	0 10 19	0 10 29	0 10 43	0 11 2	0 11 22	0 11 49	0 12 18	0 12 53	0 13 30	0 14 11	0 14 56	0 15 45	0 16 38	0 17 36
13	0 10 10	0 10 16	0 10 26	0 10 40	0 10 58	0 11 18	0 11 45	0 12 13	0 12 48	0 13 24	0 14 4	0 14 48	0 15 36	0 16 28	0 17 25
14	0 10 7	0 10 13	0 10 23	0 10 37	0 10 54	0 11 14	0 11 40	0 12 8	0 12 42	0 13 18	0 13 57	0 14 40	0 15 27	0 16 18	0 17 14
15	0 10 4	0 10 10	0 10 20	0 10 34	0 10 50	0 11 10	0 11 35	0 12 3	0 12 36	0 13 12	0 13 50	0 14 32	0 15 18	0 16 8	0 17 3
16	0 10 1	0 10 7	0 10 17	0 10 31	0 10 46	0 11 6	0 11 30	0 11 58	0 12 30	0 13 6	0 13 43	0 14 24	0 15 9	0 15 59	0 16 53
17	0 9 58	0 10 4	0 10 14	0 10 27	0 10 42	0 11 2	0 11 25	0 11 53	0 12 24	0 13 0	0 13 36	0 14 16	0 15 1	0 15 50	0 16 43
18	0 9 55	0 10 1	0 10 11	0 10 23	0 10 38	0 10 58	0 11 20	0 11 48	0 12 18	0 12 53	0 13 29	0 14 8	0 14 53	0 15 41	0 16 33
19	0 9 52	0 9 58	0 10 7	0 10 19	0 10 34	0 10 54	0 11 16	0 11 43	0 12 12	0 12 46	0 13 22	0 14 1	0 14 45	0 15 32	0 16 23
20	0 9 49	0 9 54	0 10 3	0 10 15	0 10 30	0 10 49	0 11 11	0 11 37	0 12 6	0 12 39	0 13 15	0 13 54	0 14 37	0 15 23	0 16 13
21	0 9 45	0 9 50	0 9 59	0 10 11	0 10 26	0 10 44	0 11 6	0 11 32	0 12 0	0 12 32	0 13 8	0 13 46	0 14 29	0 15 14	0 16 3
22	0 9 41	0 9 46	0 9 55	0 10 7	0 10 21	0 10 39	0 11 1	0 11 26	0 11 54	0 12 25	0 13 1	0 13 38	0 14 20	0 15 5	0 15 53
23	0 9 37	0 9 42	0 9 50	0 10 2	0 10 16	0 10 34	0 10 55	0 11 20	0 11 47	0 12 18	0 12 53	0 13 30	0 14 11	0 14 55	0 15 42

LATITUDE 38° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 21 16	0 22 38	0 24 6	0 25 38	0 27 16	0 28 58	0 30 44	0 32 37	0 34 34	0 36 36	0 38 42	0 40 53	0 43 10	0 45 31	0 47 56
1	0 21 31	0 22 55	0 24 25	0 25 59	0 27 40	0 29 24	0 31 13	0 33 9	0 35 8	0 37 12	0 39 21	0 41 35	0 43 55	0 46 19	0 48 51
2	0 21 46	0 23 13	0 24 45	0 26 21	0 28 5	0 29 51	0 31 43	0 33 42	0 35 43	0 37 50	0 40 2	0 42 19	0 44 42	0 47 9	0 49 47
3	0 22 3	0 23 32	0 25 6	0 26 44	0 28 31	0 30 19	0 32 14	0 34 16	0 36 19	0 38 30	0 40 45	0 43 5	0 45 31	0 48 2	0 50 43
4	0 22 21	0 23 52	0 25 28	0 27 9	0 28 58	0 30 48	0 32 46	0 34 51	0 36 57	0 39 12	0 41 30	0 43 53	0 46 23	0 48 58	0 51 39
5	0 22 40	0 24 13	0 25 51	0 27 35	0 29 27	0 31 19	0 33 20	0 35 28	0 37 37	0 39 56	0 42 18	0 44 44	0 47 18	0 49 57	0 52 40
6	0 23 0	0 24 36	0 26 16	0 28 3	0 29 57	0 31 52	0 33 56	0 36 7	0 38 20	0 40 43	0 43 9	0 45 38	0 48 16	0 50 59	0 53 46
7	0 23 21	0 25 0	0 26 43	0 28 32	0 30 29	0 32 27	0 34 34	0 36 49	0 39 6	0 41 33	0 44 3	0 46 35	0 49 17	0 52 4	0 54 55
8	0 23 43	0 25 25	0 27 11	0 29 3	0 31 3	0 33 4	0 35 15	0 37 34	0 39 54	0 42 25	0 44 59	0 47 35	0 50 21	0 53 12	0 56 7
9	0 24 7	0 25 52	0 27 41	0 29 36	0 31 39	0 33 44	0 35 59	0 38 21	0 40 45	0 43 19	0 45 57	0 48 38	0 51 29	0 54 24	0 57 23
10	0 24 34	0 26 21	0 28 13	0 30 12	0 32 17	0 34 26	0 36 45	0 39 11	0 41 39	0 44 16	0 46 58	0 49 45	0 52 41	0 55 40	0 58 46
11	0 25 2	0 26 52	0 28 47	0 30 49	0 32 57	0 35 10	0 37 33	0 40 2	0 42 35	0 45 17	0 48 3	0 50 56	0 53 57	0 57 2	1 0 15
12	0 25 31	0 27 25	0 29 24	0 31 28	0 33 40	0 35 57	0 38 23	0 40 57	0 43 35	0 46 22	0 49 13	0 52 12	0 55 18	0 58 29	1 1 48
13	0 26 2	0 28 0	0 30 3	0 32 10	0 34 26	0 36 48	0 39 17	0 41 57	0 44 40	0 47 32	0 50 28	0 53 33	0 56 44	1 0 1	1 3 27
14	0 26 35	0 28 37	0 30 44	0 32 55	0 35 16	0 37 44	0 40 17	0 43 2	0 45 51	0 48 48	0 51 49	0 55 0	0 58 17	1 1 40	1 5 12
15	0 27 10	0 29 17	0 31 28	0 33 44	0 36 10	0 38 44	0 41 22	0 44 12	0 47 7	0 50 10	0 53 17	0 56 34	0 59 58	1 3 27	1 7 7
16	0 27 48	0 29 59	0 32 15	0 34 37	0 37 8	0 39 48	0 42 32	0 45 27	0 48 29	0 51 39	0 54 53	0 58 16	1 1 48	1 5 24	1 9 11
17	0 28 29	0 30 45	0 33 6	0 35 34	0 38 11	0 40 57	0 43 48	0 46 49	0 49 58	0 53 15	0 56 37	1 0 7	1 3 47	1 7 32	1 11 24
18	0 29 13	0 31 34	0 34 1	0 36 35	0 39 19	0 42 11	0 45 10	0 48 18	0 51 35	0 54 59	0 58 29	1 2 7	1 5 56	1 9 50	1 13 47
19	0 30 0	0 32 27	0 35 0	0 37 41	0 40 33	0 43 32	0 46 39	0 49 55	0 53 20	0 56 52	1 0 31	1 4 18	1 8 16	1 12 19	1 16 27
20	0 30 51	0 33 24	0 36 4	0 38 54	0 41 54	0 45 1	0 48 17	0 51 41	0 55 15	0 58 56	1 2 45	1 6 41	1 10 48	1 15 0	1 19 21
21	0 31 49	0 34 29	0 37 16	0 40 15	0 43 22	0 46 38	0 50 6	0 53 39	0 57 23	1 1 13	1 5 12	1 9 18	1 13 36	1 18 0	1 22 34
22	0 32 55	0 35 43	0 38 39	0 41 48	0 45 3	0 48 29	0 52 7	0 55 51	0 59 46	1 3 46	1 7 57	1 12 14	1 16 44	1 21 21	1 26 8
23	0 34 12	0 37 9	0 40 15	0 43 35	0 46 59	0 51 36	0 54 22	0 58 18	1 2 25	1 6 38	1 11 2	1 15 32	1 20 14	1 25 5	1 30 4

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 21 16	0 22 38	0 24 6	0 25 38	0 27 16	0 28 58	0 30 44	0 32 37	0 34 34	0 36 36	0 38 42	0 40 53	0 43 10	0 45 31	0 47 56
1	0 21 2	0 22 23	0 23 48	0 25 18	0 26 54	0 28 34	0 30 18	0 32 8	0 34 2	0 36 2	0 38 5	0 40 13	0 42 26	0 44 43	0 47 6
2	0 21 48	0 22 8	0 23 30	0 24 58	0 26 32	0 28 10	0 29 52	0 31 40	0 33 31	0 35 29	0 37 29	0 39 34	0 41 43	0 43 57	0 46 17
3	0 21 34	0 21 53	0 23 13	0 24 39	0 26 11	0 27 47	0 29 27	0 31 12	0 33 1	0 34 56	0 36 54	0 38 56	0 41 2	0 43 13	0 45 30
4	0 21 20	0 21 38	0 22 56	0 24 20	0 25 50	0 27 24	0 29 2	0 30 45	0 32 32	0 34 24	0 36 20	0 38 19	0 40 23	0 42 31	0 44 45
5	0 21 6	0 21 23	0 22 39	0 24 2	0 25 30	0 27 2	0 28 38	0 30 19	0 32 4	0 33 53	0 35 47	0 37 44	0 39 46	0 41 51	0 44 2
6	0 20 53	0 21 8	0 22 23	0 23 44	0 25 10	0 26 40	0 28 15	0 29 53	0 31 36	0 33 23	0 35 15	0 37 10	0 39 10	0 41 13	0 43 21
7	0 20 40	0 20 53	0 22 7	0 23 26	0 24 51	0 26 19	0 27 52	0 29 28	0 31 9	0 32 54	0 34 44	0 36 37	0 38 35	0 40 36	0 42 42
8	0 20 27	0 20 38	0 21 51	0 23 9	0 24 32	0 25 59	0 27 30	0 29 4	0 30 43	0 32 26	0 34 14	0 36 5	0 38 1	0 40 0	0 42 4
9	0 20 14	0 20 23	0 21 36	0 22 53	0 24 14	0 25 39	0 27 9	0 28 41	0 30 18	0 31 59	0 33 45	0 35 34	0 37 28	0 39 25	0 41 27
10	0 19 1	0 20 9	0 21 21	0 22 37	0 23 56	0 25 20	0 26 48	0 28 19	0 29 54	0 31 33	0 33 17	0 35 4	0 36 56	0 38 51	0 40 51
11	0 18 49	0 19 56	0 21 7	0 22 21	0 23 39	0 25 2	0 26 28	0 27 58	0 29 31	0 31 8	0 32 50	0 34 35	0 36 25	0 38 18	0 40 16
12	0 18 37	0 19 43	0 20 53	0 22 6	0 23 22	0 24 44	0 26 8	0 27 37	0 29 8	0 30 43	0 32 23	0 34 6	0 35 55	0 37 46	0 39 42
13	0 18 25	0 19 30	0 20 39	0 21 51	0 23 5	0 24 26	0 25 49	0 27 16	0 28 45	0 30 18	0 31 56	0 33 38	0 35 25	0 37 15	0 39 9
14	0 18 13	0 19 17	0 20 25	0 21 36	0 22 49	0 24 8	0 25 30	0 26 55	0 28 23	0 29 54	0 31 30	0 33 10	0 34 56	0 36 44	0 38 36
15	0 18 1	0 19 4	0 20 11	0 21 21	0 22 33	0 23 50	0 25 11	0 26 34	0 28 1	0 29 30	0 31 4	0 32 43	0 34 27	0 36 14	0 38 4
16	0 17 50	0 18 51	0 19 57	0 21 6	0 22 17	0 23 32	0 24 52	0 26 13	0 27 39	0 29 7	0 30 39	0 32 17	0 33 59	0 35 44	0 37 32
17	0 17 39	0 18 39	0 19 43	0 20 51	0 22 1	0 23 14	0 24 33	0 25 53	0 27 17	0 28 44	0 30 15	0 31 51	0 33 31	0 35 14	0 37 1
18	0 17 28	0 18 27	0 19 29	0 20 36	0 21 45	0 22 57	0 24 14	0 25 33	0 26 56	0 28 22	0 29 51	0 31 26	0 33 4	0 34 45	0 36 30
19	0 17 17	0 18 15	0 19 16	0 20 21	0 21 29	0 22 40	0 23 55	0 25 13	0 26 35	0 28 0	0 29 28	0 31 1	0 32 37	0 34 16	0 35 59
20	0 17 6	0 18 3	0 19 3	0 20 6	0 21 13	0 22 23	0 23 36	0 24 53	0 26 14	0 27 38	0 29 5	0 30 36	0 32 10	0 33 47	0 35 28
21	0 16 55	0 17 51	0 18 50	0 19 51	0 20 57	0 22 6	0 23 18	0 24 34	0 25 53	0 27 16	0 28 42	0 30 11	0 31 43	0 33 19	0 34 58
22	0 16 44	0 17 39	0 18 37	0 19 37	0 20 42	0 21 50	0 23 0	0 24 15	0 25 33	0 26 54	0 28 19	0 29 46	0 31 17	0 32 51	0 34 28
23	0 16 32	0 17 26	0 18 23	0 19 23	0 20 27	0 21 34	0 22 43	0 23 57	0 25 13	0 26 33	0 27 56	0 29 22	0 30 51	0 32 24	0 33 59

LATITUDE 38° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 50 28	0 53 3	0 55 43	0 58 29	1 1 18	1 4 12	1 7 11	1 10 15	1 13 24	1 16 37	1 19 54	1 23 16	1 26 42	1 30 14	1 33 50
1	0 51 25	0 54 3	0 56 47	0 59 36	1 2 29	1 5 27	1 8 30	1 11 38	1 14 51	1 18 8	1 21 29	1 24 55	1 28 26	1 32 2	1 35 43
2	0 52 23	0 55 4	0 57 52	1 0 45	1 3 42	1 6 44	1 9 51	1 13 3	1 16 20	1 19 42	1 23 7	1 26 37	1 30 13	1 33 54	1 37 39
3	0 53 23	0 56 7	0 58 59	1 1 55	1 4 56	1 8 3	1 11 15	1 14 31	1 17 52	1 21 18	1 24 48	1 28 23	1 32 4	1 35 50	1 39 39
4	0 54 25	0 57 13	1 0 9	1 3 9	1 6 14	1 9 25	1 12 41	1 16 2	1 18 28	1 22 58	1 26 33	1 30 14	1 34 0	1 37 51	1 41 45
5	0 55 29	0 58 23	1 1 23	1 4 28	1 7 37	1 10 51	1 14 11	1 17 37	1 21 8	1 24 43	1 28 24	1 32 10	1 36 1	1 39 57	1 43 57
6	0 56 38	0 59 36	1 2 40	1 5 50	1 9 4	1 12 23	1 15 48	1 19 19	1 22 55	1 26 35	1 30 21	1 34 12	1 38 8	1 42 10	1 46 16
7	0 57 52	1 0 54	1 4 3	1 7 18	1 10 37	1 14 1	1 17 31	1 21 7	1 24 48	1 28 34	1 32 26	1 36 22	1 40 24	1 44 32	1 48 44
8	0 59 11	1 2 19	1 5 33	1 8 52	1 12 16	1 15 45	1 19 20	1 23 1	1 26 48	1 30 40	1 34 38	1 38 40	1 42 48	1 47 3	1 51 21
9	1 0 34	1 3 46	1 7 5	1 10 29	1 13 58	1 17 34	1 21 14	1 25 1	1 28 54	1 32 52	1 36 56	1 41 5	1 45 19	1 49 39	1 54 4
10	1 2 0	1 5 19	1 8 42	1 12 10	1 15 45	1 19 27	1 23 15	1 27 9	1 31 7	1 35 11	1 39 21	1 43 37	1 47 58	1 52 23	1 56 55
11	1 3 34	1 6 59	1 10 28	1 14 2	1 17 43	1 21 31	1 25 25	1 29 25	1 33 30	1 37 41	1 41 57	1 46 20	1 50 48	1 55 20	1 59 58
12	1 5 13	1 8 44	1 12 19	1 16 0	1 19 48	1 23 42	1 27 42	1 31 49	1 36 1	1 40 19	1 44 42	1 49 13	1 53 48	1 58 28	2 3 14
13	1 6 58	1 10 35	1 14 17	1 18 5	1 22 0	1 26 1	1 30 8	1 34 22	1 38 42	1 43 7	1 47 39	1 52 17	1 57 0	2 1 49	2 6 43
14	1 8 50	1 12 32	1 16 21	1 20 17	1 24 20	1 28 29	1 32 44	1 37 5	1 41 33	1 46 6	1 50 47	1 55 33	2 0 25	2 5 23	2 10 26
15	1 10 51	1 14 39	1 18 36	1 22 41	1 26 52	1 31 9	1 35 32	1 40 1	1 44 37	1 49 19	1 54 8	1 59 3	2 4 4	2 9 10	2 14 22
16	1 13 3	1 17 0	1 21 6	1 25 18	1 29 37	1 34 2	1 38 35	1 43 14	1 47 58	1 52 48	1 57 46	2 2 51	2 8 1	2 13 16	2 18 38
17	1 15 24	1 19 30	1 23 44	1 28 7	1 32 35	1 37 8	1 41 48	1 46 37	1 51 32	1 56 34	2 1 42	2 6 57	2 12 17	2 17 41	2 23 12
18	1 17 56	1 22 13	1 26 37	1 31 7	1 35 44	1 40 29	1 45 21	1 50 20	1 55 25	2 0 36	2 5 54	2 11 20	2 16 51	2 22 28	2 28 12
19	1 20 46	1 25 12	1 29 46	1 34 27	1 39 15	1 44 10	1 49 13	1 54 23	1 59 39	2 5 2	2 10 32	2 16 9	2 21 51	2 27 37	2 33 32
20	1 23 50	1 28 26	1 33 12	1 38 6	1 43 6	1 48 11	1 53 24	1 58 45	2 4 14	2 9 50	2 15 33	2 21 22	2 27 17	2 33 18	2 39 26
21	1 27 14	1 32 3	1 37 0	1 42 5	1 47 17	1 52 37	1 58 4	2 3 39	2 9 20	2 15 7	2 21 2	2 27 6	2 33 16	2 39 31	2 45 53
22	1 31 1	1 36 0	1 41 14	1 46 32	1 51 57	1 57 28	2 3 9	2 8 58	2 14 51	2 20 54	2 27 4	2 33 22	2 39 46	2 46 18	2 52 55
23	1 35 11	1 40 26	1 45 51	1 51 25	1 57 5	2 2 53	2 8 48	2 14 49	2 21 1	2 27 22	2 33 47	2 40 17	2 46 57	2 53 46	3 0 38

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 50 28	0 53 3	0 55 43	0 58 29	1 1 18	1 4 12	1 7 11	1 10 15	1 13 24	1 16 37	1 19 54	1 23 16	1 26 42	1 30 14	1 33 50
1	0 49 34	0 52 7	0 54 44	0 57 26	1 0 12	1 3 4	1 5 59	1 8 58	1 12 2	1 15 11	1 18 25	1 21 42	1 25 3	1 28 31	1 32 3
2	0 48 42	0 51 13	0 53 47	0 56 25	0 59 8	1 1 57	1 4 49	1 7 44	1 10 44	1 13 49	1 16 59	1 20 12	1 23 28	1 26 52	1 30 20
3	0 47 52	0 50 20	0 52 51	0 55 26	0 58 6	1 0 52	1 3 41	1 6 33	1 9 29	1 12 30	1 15 36	1 18 45	1 21 57	1 25 17	1 28 41
4	0 47 4	0 49 29	0 51 57	0 54 29	0 57 6	0 59 49	1 2 35	1 5 24	1 8 17	1 11 14	1 14 16	1 17 22	1 20 30	1 23 46	1 27 6
5	0 46 18	0 48 40	0 51 5	0 53 34	0 56 8	0 58 48	1 1 31	1 4 17	1 7 7	1 10 1	1 12 59	1 16 2	1 19 7	1 22 18	1 25 34
6	0 45 34	0 47 53	0 50 15	0 52 41	0 55 12	0 57 49	1 0 29	1 3 12	1 5 59	1 8 50	1 11 45	1 14 45	1 17 47	1 20 53	1 24 5
7	0 44 52	0 47 8	0 49 27	0 51 50	0 54 18	0 56 52	0 59 29	1 2 9	1 4 53	1 7 41	1 10 33	1 13 30	1 16 29	1 19 31	1 22 39
8	0 44 12	0 46 25	0 48 41	0 51 1	0 53 26	0 55 57	0 58 31	1 1 8	1 3 49	1 6 34	1 9 23	1 12 17	1 15 13	1 18 12	1 21 16
9	0 43 33	0 45 44	0 47 57	0 50 15	0 52 37	0 55 4	0 57 35	1 0 9	1 2 47	1 5 29	1 8 15	1 11 6	1 13 59	1 16 55	1 19 56
10	0 42 55	0 45 4	0 47 15	0 49 30	0 51 49	0 54 13	0 56 41	0 59 12	1 1 47	1 4 26	1 7 9	1 9 57	1 12 47	1 15 40	1 18 38
11	0 42 18	0 44 25	0 46 34	0 48 46	0 51 3	0 53 24	0 55 49	0 58 17	1 0 48	1 3 25	1 6 5	1 8 49	1 11 36	1 14 26	1 17 21
12	0 41 42	0 43 47	0 45 53	0 48 3	0 50 18	0 52 36	0 54 58	0 57 24	0 59 51	1 2 26	1 5 3	1 7 42	1 10 27	1 13 14	1 16 6
13	0 41 7	0 43 9	0 45 13	0 47 21	0 49 33	0 51 49	0 54 8	0 56 31	0 58 56	1 1 28	1 4 2	1 6 38	1 9 20	1 12 4	1 14 53
14	0 40 32	0 42 32	0 44 34	0 46 39	0 48 49	0 51 3	0 53 19	0 55 39	0 58 2	1 0 31	1 3 2	1 5 34	1 8 15	1 10 56	1 13 42
15	0 39 58	0 41 55	0 43 55	0 45 58	0 48 6	0 50 17	0 52 31	0 54 48	0 57 9	0 59 35	1 2 3	1 4 35	1 7 11	1 9 49	1 12 33
16	0 39 24	0 41 19	0 43 17	0 45 18	0 47 23	0 49 32	0 51 43	0 53 58	0 56 17	0 58 40	1 1 5	1 3 36	1 6 9	1 8 44	1 11 26
17	0 38 50	0 40 43	0 42 39	0 44 38	0 46 41	0 48 47	0 50 56	0 53 9	0 55 26	0 57 46	1 0 9	1 2 38	1 5 9	1 7 41	1 10 20
18	0 38 17	0 40 8	0 42 2	0 43 58	0 45 59	0 48 3	0 50 10	0 52 21	0 54 36	0 56 54	0 59 15	1 1 41	1 4 10	1 6 40	1 9 16
19	0 37 44	0 39 33	0 41 25	0 43 19	0 45 18	0 47 20	0 49 25	0 51 34	0 53 47	0 56 3	0 58 22	1 0 45	1 3 13	1 5 40	1 8 13
20	0 37 11	0 38 58	0 40 48	0 42 41	0 44 38	0 46 38	0 48 41	0 50 48	0 52 59	0 55 13	0 57 30	0 59 51	1 2 15	1 4 41	1 7 11
21	0 36 39	0 38 24	0 40 12	0 42 4	0 43 59	0 45 57	0 47 58	0 50 3	0 52 11	0 54 23	0 56 38	0 58 57	1 1 18	1 3 42	1 6 10
22	0 36 8	0 37 51	0 39 37	0 41 28	0 43 20	0 45 16	0 47 15	0 49 18	0 51 24	0 53 34	0 55 47	0 58 3	1 0 22	1 2 44	1 5 9
23	0 35 37	0 37 18	0 39 3	0 40 51	0 42 42	0 44 36	0 46 33	0 48 34	1 50 38	0 52 46	0 54 56	0 57 9	0 59 26	1 1 46	1 4 9

LATITUDE 38° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 37 30	1 41 15	1 45 4	1 48 58	1 52 56	1 56 58	2 1 5	2 5 16	2 9 32	2 13 52	2 18 16	2 22 44	2 27 16	2 31 52	2 36 34
1	1 39 27	1 43 17	1 47 11	1 51 10	1 55 13	1 59 21	2 3 33	2 7 49	2 12 10	2 16 35	2 21 4	2 25 37	2 30 15	2 34 58	2 39 45
2	1 41 28	1 45 23	1 49 22	1 53 26	1 57 35	2 1 48	2 6 5	2 10 27	2 14 53	2 19 24	2 23 57	2 28 36	2 33 20	2 38 9	2 43 2
3	1 43 33	1 47 33	1 51 38	1 55 47	2 0 1	2 4 19	2 8 42	2 13 10	2 17 42	2 22 18	2 26 56	2 31 41	2 36 31	2 41 26	2 46 25
4	1 45 44	1 49 49	1 53 59	1 58 14	2 2 34	2 6 57	2 11 25	2 15 59	2 20 37	2 25 18	2 30 3	2 34 54	2 39 50	2 44 51	2 49 55
5	1 48 2	1 52 12	1 56 27	2 0 47	2 5 13	2 9 43	2 14 17	2 18 55	2 23 38	2 28 26	2 33 19	2 38 17	2 43 19	2 48 24	2 53 33
6	1 50 27	1 54 43	1 59 4	2 3 30	2 8 2	2 12 38	2 17 18	2 22 2	2 26 50	2 31 45	2 36 45	2 41 50	2 46 59	2 52 12	2 57 29
7	1 53 0	1 57 22	2 1 49	2 6 22	2 11 0	2 15 43	2 20 29	2 25 19	2 30 14	2 35 16	2 40 24	2 45 36	2 50 52	2 56 13	3 1 39
8	1 55 43	2 0 11	2 4 44	2 9 23	2 14 9	2 18 58	2 23 50	2 28 48	2 33 51	2 39 0	2 44 16	2 49 36	2 54 59	3 0 28	3 6 3
9	1 58 34	2 3 9	2 7 49	2 12 34	2 17 27	2 22 23	2 27 22	2 32 28	2 37 39	2 42 55	2 48 18	2 53 45	2 59 15	3 4 51	3 10 33
10	2 1 33	2 6 15	2 11 2	2 15 55	2 20 54	2 25 58	2 31 6	2 36 19	2 41 37	2 47 0	2 52 29	2 58 2	3 3 39	3 9 22	3 15 11
11	2 4 43	2 9 33	2 14 28	2 19 29	2 24 35	2 29 47	2 35 3	2 40 24	2 45 50	2 51 22	2 56 59	3 2 40	3 8 25	3 14 16	3 20 14
12	2 8 6	2 13 4	2 18 7	2 23 16	2 28 30	2 33 50	2 39 15	2 44 45	2 50 19	2 56 0	3 1 45	3 7 34	3 13 27	3 19 27	3 23 34
13	2 11 43	2 16 49	2 22 1	2 27 18	2 32 40	2 38 8	2 43 43	2 49 22	2 55 6	3 0 55	3 6 49	3 12 47	3 18 49	3 24 58	3 31 15
14	2 15 34	2 20 49	2 26 10	2 31 36	2 37 7	2 42 44	2 48 28	2 54 16	3 0 10	3 6 9	3 12 12	3 18 19	3 24 32	3 30 50	3 37 15
15	2 19 40	2 25 4	2 30 34	2 36 10	2 41 52	2 47 39	2 53 32	2 59 30	3 5 34	3 11 42	3 17 55	3 24 13	3 30 37	3 37 5	3 43 38
16	2 24 8	2 29 42	2 35 21	2 41 6	2 46 57	2 52 55	2 59 0	3 5 8	3 11 21	3 17 39	3 24 3	3 30 32	3 37 7	3 43 46	3 50 30
17	2 28 51	2 34 36	2 40 28	2 46 25	2 52 27	2 58 36	3 4 51	3 11 10	3 17 34	3 24 4	3 30 39	3 37 19	3 44 5	3 50 55	3 57 51
18	2 34 2	2 39 58	2 46 1	2 52 9	2 58 22	3 4 42	3 11 9	3 17 40	3 24 15	3 30 56	3 37 43	3 44 35	3 51 33	3 58 37	4 5 46
19	2 39 36	2 45 45	2 51 59	2 58 19	3 4 46	3 11 19	3 17 59	3 24 42	3 31 29	3 38 23	3 45 23	3 52 28	3 59 38	4 6 54	4 14 15
20	2 45 41	2 52 2	2 58 30	3 5 3	3 11 40	3 18 26	3 25 20	3 32 17	3 39 18	3 46 25	3 53 37	4 0 55	4 8 20	4 15 48	4 23 19
21	2 52 21	2 58 56	3 5 37	3 12 24	3 19 16	3 26 16	3 33 22	3 40 32	3 47 48	3 55 10	4 2 37	4 10 8	4 17 43	4 25 25	4 33 16
22	2 59 37	3 6 25	3 13 19	3 20 21	3 27 29	3 34 44	3 42 7	3 49 34	3 57 4	4 4 40	4 12 21	4 20 8	4 28 0	4 35 56	4 43 57
23	3 7 35	3 14 40	3 21 53	3 29 11	3 36 34	3 44 5	3 51 44	3 59 25	4 7 10	4 15 1	4 22 57	4 31 0	4 39 9	4 47 21	4 55 36

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 37 30	1 41 15	1 45 4	1 48 58	1 52 56	1 56 58	2 1 5	2 5 16	2 9 32	2 13 52	2 18 16	2 22 44	2 27 16	2 31 53	2 36 34
1	1 35 40	1 39 21	1 43 6	1 46 55	1 50 49	1 54 47	1 58 49	2 2 54	2 7 5	2 11 21	2 15 40	2 20 4	2 24 32	2 29 5	2 33 41
2	1 33 54	1 37 31	1 41 12	1 44 57	1 48 47	1 52 40	1 56 37	2 0 36	2 4 42	2 8 54	2 13 9	2 17 29	2 21 53	2 26 21	2 30 52
3	1 32 12	1 35 45	1 39 22	1 43 3	1 46 49	1 50 37	1 54 29	1 58 23	2 2 24	2 6 31	2 10 42	2 14 58	2 19 17	2 23 40	2 28 6
4	1 30 33	1 34 2	1 37 35	1 41 12	1 44 54	1 48 38	1 52 25	1 56 15	2 0 11	2 4 13	2 8 19	2 12 31	2 16 45	2 21 3	2 25 24
5	1 28 57	1 32 22	1 35 51	1 39 24	1 43 2	1 46 42	1 50 25	1 54 11	1 58 3	2 2 0	2 6 1	2 10 8	2 14 17	2 18 30	2 22 46
6	1 27 24	1 30 45	1 34 10	1 37 39	1 41 13	1 44 49	1 48 28	1 52 11	1 55 59	1 59 51	2 3 47	2 7 49	2 11 53	2 16 1	2 20 12
7	1 25 54	1 29 11	1 32 32	1 35 57	1 39 27	1 42 59	1 46 34	1 50 14	1 53 58	1 57 46	2 1 37	2 5 34	2 9 33	2 13 36	2 17 43
8	1 24 27	1 27 40	1 30 57	1 34 18	1 37 44	1 41 12	1 44 44	1 48 20	1 51 0	1 55 44	1 59 30	2 3 23	2 7 17	2 11 15	2 15 18
9	1 23 3	1 26 12	1 29 25	1 32 42	1 36 4	1 39 28	1 42 57	1 46 29	1 49 5	1 53 45	1 57 27	2 1 15	2 5 5	2 8 59	2 12 58
10	1 21 41	1 24 47	1 27 56	1 31 9	1 34 27	1 37 48	1 41 13	1 44 41	1 48 13	1 51 49	1 55 28	1 59 11	2 2 57	2 6 47	2 10 42
11	1 20 21	1 23 24	1 26 30	1 29 38	1 32 53	1 36 11	1 39 32	1 42 56	1 46 24	1 49 56	1 53 31	1 57 10	2 0 52	2 4 38	2 8 29
12	1 19 3	1 22 3	1 25 6	1 28 10	1 31 23	1 34 37	1 37 54	1 41 14	1 44 38	1 48 6	1 51 37	1 55 12	1 58 50	2 2 32	2 6 19
13	1 17 47	1 20 44	1 23 44	1 26 45	1 29 55	1 33 5	1 36 19	1 39 35	1 42 55	1 46 19	1 49 46	1 53 18	1 56 52	2 0 30	2 4 13
14	1 16 33	1 19 27	1 22 24	1 25 22	1 28 29	1 31 36	1 34 47	1 37 59	1 41 15	1 44 35	1 47 59	1 51 27	1 54 58	1 58 32	2 2 11
15	1 15 21	1 18 12	1 21 6	1 24 1	1 27 5	1 30 9	1 33 17	1 36 25	1 39 38	1 42 55	1 46 15	1 49 40	1 53 8	1 56 38	2 0 13
16	1 14 11	1 16 59	1 19 50	1 22 42	1 25 43	1 28 44	1 31 49	1 34 54	1 38 4	1 41 18	1 44 35	1 47 56	1 51 21	1 54 47	1 58 18
17	1 13 2	1 15 47	1 18 35	1 21 24	1 24 22	1 27 20	1 30 22	1 33 25	1 36 32	1 39 43	1 42 57	1 46 15	1 49 37	1 53 0	1 56 27
18	1 11 55	1 14 37	1 17 22	1 20 8	1 23 3	1 25 58	1 28 57	1 31 58	1 35 2	1 38 10	1 41 21	1 44 36	1 47 55	1 51 15	1 54 39
19	1 10 49	1 13 28	1 16 10	1 18 54	1 21 46	1 24 38	1 27 34	1 30 33	1 33 34	1 36 39	1 39 47	1 42 59	1 46 15	1 49 32	1 52 53
20	1 9 44	1 12 20	1 14 59	1 17 42	1 20 30	1 23 20	1 26 13	1 29 9	1 32 8	1 35 10	1 38 15	1 41 24	1 44 36	1 47 50	1 51 8
21	1 8 40	1 11 14	1 13 50	1 16 31	1 19 16	1 22 3	1 24 53	1 27 46	1 30 42	1 33 31	1 36 44	1 39 50	1 42 58	1 46 9	1 49 24
22	1 7 37	1 10 8	1 12 42	1 15 20	1 18 2	1 20 47	1 23 34	1 26 24	1 29 17	1 32 3	1 35 13	1 38 16	1 41 21	1 44 29	1 47 41
23	1 6 34	1 9 3	1 11 35	1 14 10	1 16 49	1 19 31	1 22 16	1 25 3	1 27 53	1 30 46	1 33 43	1 36 43	1 39 45	1 42 50	2 45 59

LATITUDE 39° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 36	0 10 44	0 10 55	0 11 12	0 11 34	0 12 1	0 12 32	0 13 9	0 13 50	0 14 36	0 15 27	0 16 23	0 17 23	0 18 28	0 19 38
1	0 10 37	0 10 45	0 10 57	0 11 14	0 11 37	0 12 4	0 12 36	0 13 14	0 13 56	0 14 43	0 15 35	0 16 32	0 17 31	0 18 38	0 19 49
2	0 10 38	0 10 47	0 10 59	0 11 16	0 11 40	0 12 7	0 12 40	0 13 19	0 14 2	0 14 50	0 15 43	0 16 41	0 17 40	0 18 49	0 20 2
3	0 10 40	0 10 48	0 11 1	0 11 18	0 11 43	0 12 10	0 12 44	0 13 24	0 14 8	0 14 57	0 15 51	0 16 50	0 17 50	0 19 1	0 20 16
4	0 10 41	0 10 50	0 11 3	0 11 20	0 11 46	0 12 14	0 12 48	0 13 29	0 14 14	0 15 4	0 15 59	0 16 59	0 18 0	0 19 14	0 20 31
5	0 10 43	0 10 51	0 11 5	0 11 22	0 11 49	0 12 18	0 12 53	0 13 35	0 14 20	0 15 11	0 16 8	0 17 9	0 18 11	0 19 28	0 20 47
6	0 10 44	0 10 53	0 11 7	0 11 24	0 11 52	0 12 22	0 12 58	0 13 41	0 14 27	0 15 19	0 16 17	0 17 20	0 18 24	0 19 43	0 21 4
7	0 10 45	0 10 54	0 11 9	0 11 26	0 11 55	0 12 26	0 13 3	0 13 47	0 14 34	0 15 27	0 16 27	0 17 32	0 18 38	0 19 59	0 21 22
8	0 10 47	0 10 56	0 11 11	0 11 29	0 11 58	0 12 30	0 13 8	0 13 53	0 14 41	0 15 36	0 16 38	0 17 45	0 18 53	0 20 16	0 21 41
9	0 10 48	0 10 57	0 11 13	0 11 32	0 12 1	0 12 34	0 13 13	0 13 59	0 14 49	0 15 46	0 16 49	0 17 58	0 19 9	0 20 34	0 22 1
10	0 10 50	0 10 59	0 11 15	0 11 35	0 12 5	0 12 38	0 13 18	0 14 5	0 14 57	0 15 56	0 17 1	0 18 12	0 19 28	0 20 53	0 22 22
11	0 10 52	0 11 0	0 11 17	0 11 38	0 12 9	0 12 43	0 13 23	0 14 11	0 15 5	0 16 6	0 17 13	0 18 27	0 19 46	0 21 13	0 22 44
12	0 10 54	0 11 1	0 11 19	0 11 41	0 12 13	0 12 48	0 13 28	0 14 18	0 15 14	0 16 17	0 17 26	0 18 43	0 20 5	0 21 34	0 23 8
13	0 10 56	0 11 2	0 11 21	0 11 44	0 12 17	0 12 53	0 13 34	0 14 26	0 15 23	0 16 29	0 17 40	0 19 0	0 20 25	0 21 56	0 23 33
14	0 10 57	0 11 3	0 11 23	0 11 47	0 12 21	0 12 58	0 13 41	0 14 34	0 15 33	0 16 42	0 17 55	0 19 18	0 20 46	0 22 19	0 24 0
15	0 10 58	0 11 5	0 11 25	0 11 50	0 12 25	0 13 4	0 13 48	0 14 43	0 15 44	0 16 56	0 18 11	0 19 37	0 21 8	0 22 43	0 24 28
16	0 10 59	0 11 7	0 11 27	0 11 53	0 12 29	0 13 10	0 13 56	0 14 53	0 15 56	0 17 10	0 18 27	0 19 56	0 21 30	0 23 9	0 24 58
17	0 11 0	0 11 9	0 11 29	0 11 56	0 12 33	0 13 16	0 14 4	0 15 3	0 16 8	0 17 25	0 18 45	0 20 17	0 21 54	0 23 37	0 25 30
18	0 11 1	0 11 11	0 11 31	0 12 0	0 12 37	0 13 22	0 14 13	0 15 14	0 16 21	0 17 41	0 19 4	0 20 39	0 22 20	0 24 7	0 26 4
19	0 11 2	0 11 13	0 11 33	0 12 4	0 12 41	0 13 29	0 14 22	0 15 25	0 16 35	0 17 58	0 19 25	0 21 3	0 22 48	0 24 39	0 26 41
20	0 11 3	0 11 15	0 11 36	0 12 8	0 12 45	0 13 36	0 14 32	0 15 37	0 16 50	0 18 17	0 19 48	0 21 29	0 23 18	0 25 14	0 27 21
21	0 11 4	0 11 17	0 11 39	0 12 12	0 12 51	0 13 44	0 14 43	0 15 51	0 17 7	0 18 38	0 20 13	0 21 58	0 23 52	0 25 53	0 28 5
22	0 11 5	0 11 19	0 11 42	0 12 17	0 12 59	0 13 53	0 14 56	0 16 7	0 17 27	0 19 2	0 20 41	0 22 31	0 24 31	0 26 38	0 28 56
23	0 11 7	0 11 22	0 11 45	0 12 22	0 13 8	0 14 3	0 15 10	0 16 25	0 17 50	0 19 30	0 21 14	0 23 10	0 25 16	0 27 30	0 29 54

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 36	0 10 44	0 10 55	0 11 12	0 11 34	0 12 1	0 12 32	0 13 9	0 13 50	0 14 36	0 15 27	0 16 23	0 17 23	0 18 28	0 19 38
1	0 10 34	0 10 42	0 10 53	0 11 10	0 11 31	0 11 58	0 12 27	0 13 5	0 13 44	0 14 29	0 15 19	0 16 14	0 17 13	0 18 17	0 19 26
2	0 10 32	0 10 40	0 10 51	0 11 8	0 11 28	0 11 55	0 12 23	0 13 1	0 13 38	0 14 22	0 15 11	0 16 5	0 17 3	0 18 6	0 19 14
3	0 10 30	0 10 38	0 10 49	0 11 6	0 11 25	0 11 52	0 12 19	0 12 56	0 13 32	0 14 15	0 15 3	0 15 56	0 16 53	0 17 55	0 19 2
4	0 10 28	0 10 36	0 10 47	0 11 3	0 11 22	0 11 49	0 12 15	0 12 51	0 13 26	0 14 9	0 14 56	0 15 48	0 16 44	0 17 44	0 18 50
5	0 10 26	0 10 34	0 10 45	0 11 0	0 11 19	0 11 46	0 12 11	0 12 46	0 13 20	0 14 3	0 14 49	0 15 40	0 16 35	0 17 34	0 18 38
6	0 10 24	0 10 32	0 10 43	0 10 57	0 11 16	0 11 42	0 12 7	0 12 41	0 13 15	0 13 57	0 14 42	0 15 32	0 16 26	0 17 24	0 18 26
7	0 10 22	0 10 30	0 10 41	0 10 54	0 11 13	0 11 38	0 12 3	0 12 36	0 13 10	0 13 51	0 14 35	0 15 24	0 16 17	0 17 14	0 18 15
8	0 10 20	0 10 28	0 10 38	0 10 51	0 11 10	0 11 34	0 11 59	0 12 31	0 13 5	0 13 45	0 14 28	0 15 16	0 16 8	0 17 4	0 18 4
9	0 10 18	0 10 25	0 10 35	0 10 48	0 11 7	0 11 30	0 11 55	0 12 26	0 13 0	0 13 39	0 14 21	0 15 8	0 15 59	0 16 54	0 17 53
10	0 10 16	0 10 22	0 10 32	0 10 45	0 11 3	0 11 26	0 11 51	0 12 21	0 12 55	0 13 33	0 14 14	0 15 0	0 15 50	0 16 44	0 17 42
11	0 10 13	0 10 19	0 10 29	0 10 42	0 11 0	0 11 22	0 11 47	0 12 16	0 12 50	0 13 27	0 14 7	0 14 52	0 15 41	0 16 34	0 17 31
12	0 10 10	0 10 16	0 10 26	0 10 39	0 10 57	0 11 18	0 11 43	0 12 11	0 12 45	0 13 21	0 14 0	0 14 44	0 15 32	0 16 24	0 17 20
13	0 10 7	0 10 13	0 10 23	0 10 36	0 10 53	0 11 14	0 11 39	0 12 6	0 12 40	0 13 15	0 13 53	0 14 36	0 15 23	0 16 14	0 17 9
14	0 10 4	0 10 10	0 10 20	0 10 33	0 10 49	0 11 10	0 11 35	0 12 1	0 12 35	0 13 9	0 13 46	0 14 28	0 15 14	0 16 5	0 16 59
15	0 10 1	0 10 7	0 10 17	0 10 30	0 10 45	0 11 6	0 11 30	0 11 56	0 12 29	0 13 3	0 13 39	0 14 20	0 15 6	0 15 56	0 16 49
16	0 9 58	0 10 4	0 10 14	0 10 26	0 10 41	0 11 2	0 11 25	0 11 51	0 12 23	0 12 57	0 13 32	0 14 12	0 14 58	0 15 47	0 16 39
17	0 9 55	0 10 1	0 10 11	0 10 22	0 10 37	0 10 58	0 11 20	0 11 46	0 12 17	0 12 51	0 13 25	0 14 5	0 14 50	0 15 38	0 16 29
18	0 9 52	0 9 58	0 10 7	0 10 18	0 10 33	0 10 54	0 11 15	0 11 41	0 12 11	0 12 45	0 13 18	0 13 58	0 14 42	0 15 29	0 16 19
19	0 9 49	0 9 54	0 10 3	0 10 14	0 10 29	0 10 49	0 11 10	0 11 36	0 12 5	0 12 38	0 13 12	0 13 51	0 14 34	0 15 20	0 16 9
20	0 9 45	0 9 50	0 9 59	0 10 10	0 10 25	0 10 44	0 11 5	0 11 30	0 11 59	0 12 31	0 13 6	0 13 44	0 14 26	0 15 11	0 15 59
21	0 9 41	0 9 46	0 9 55	0 10 6	0 10 20	0 10 39	0 11 0	0 11 24	0 11 53	0 12 24	0 12 59	0 13 36	0 14 18	0 15 2	0 15 49
22	0 9 37	0 9 42	0 9 50	0 10 1	0 10 15	0 10 34	0 10 55	0 11 18	0 11 46	0 12 17	0 12 51	0 13 28	0 14 9	0 14 53	0 15 39
23	0 9 32	0 9 37	0 9 45	0 9 56	0 10 10	0 10 28	0 10 49	0 11 12	0 11 39	0 12 10	0 12 43	0 13 20	0 14 0	0 14 43	0 15 29

LATITUDE 39° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 20 53	0 22 13	0 23 37	0 25 6	0 26 40	0 28 19	0 30 2	0 31 51	0 33 44	0 35 41	0 37 43	0 39 50	0 42 1	0 44 18	0 46 38
1	0 21 6	0 22 29	0 23 55	0 25 26	0 27 2	0 28 42	0 30 28	0 32 20	0 34 15	0 36 15	0 38 20	0 40 30	0 42 44	0 45 4	0 47 27
2	0 21 21	0 22 46	0 24 14	0 25 47	0 27 25	0 29 7	0 30 55	0 32 50	0 34 47	0 36 50	0 38 58	0 41 11	0 43 28	0 45 51	0 48 17
3	0 21 37	0 23 4	0 24 34	0 26 9	0 27 49	0 29 33	0 31 24	0 33 22	0 35 21	0 37 27	0 39 38	0 41 54	0 44 14	0 46 40	0 49 10
4	0 21 54	0 23 23	0 24 55	0 26 32	0 28 14	0 30 0	0 31 54	0 33 55	0 35 57	0 38 6	0 40 20	0 42 39	0 45 2	0 47 31	0 50 5
5	0 22 12	0 23 43	0 25 17	0 26 56	0 28 41	0 30 29	0 32 26	0 34 30	0 36 35	0 38 47	0 41 4	0 43 26	0 45 52	0 48 25	0 51 2
6	0 22 31	0 24 4	0 25 40	0 27 22	0 29 10	0 31 0	0 33 0	0 35 7	0 37 15	0 39 30	0 41 50	0 44 15	0 46 44	0 49 21	0 52 3
7	0 22 51	0 24 26	0 26 4	0 27 49	0 29 40	0 31 33	0 33 36	0 35 46	0 37 57	0 40 15	0 42 39	0 45 7	0 47 40	0 50 20	0 53 7
8	0 23 12	0 24 49	0 26 29	0 28 17	0 30 11	0 32 8	0 34 14	0 36 27	0 38 41	0 41 2	0 43 30	0 46 2	0 48 39	0 51 23	0 54 14
9	0 23 34	0 25 13	0 26 56	0 28 47	0 30 44	0 32 45	0 34 54	0 37 10	0 39 28	0 41 52	0 44 24	0 47 0	0 49 42	0 52 30	0 55 25
10	0 23 57	0 25 38	0 27 25	0 29 19	0 31 19	0 33 24	0 35 36	0 37 55	0 40 18	0 42 45	0 45 21	0 48 2	0 50 49	0 53 41	0 56 40
11	0 24 22	0 26 5	0 27 55	0 29 53	0 31 56	0 34 5	0 36 21	0 38 44	0 41 11	0 43 42	0 46 22	0 49 8	0 52 0	0 54 57	0 58 0
12	0 24 48	0 26 34	0 28 27	0 30 29	0 32 35	0 34 48	0 37 8	0 39 35	0 42 7	0 44 42	0 47 27	0 50 18	0 53 15	0 56 17	0 59 25
13	0 25 16	0 27 5	0 29 1	0 31 7	0 33 16	0 35 33	0 37 58	0 40 29	0 43 6	0 45 46	0 48 36	0 51 32	0 54 35	0 57 42	1 0 56
14	0 25 46	0 27 39	0 29 37	0 31 47	0 34 0	0 36 21	0 38 51	0 41 27	0 44 8	0 46 54	0 49 50	0 52 51	0 56 0	0 59 13	1 2 32
15	0 26 18	0 28 15	0 30 16	0 32 31	0 34 48	0 37 13	0 39 48	0 42 29	0 45 15	0 47 7	0 51 9	0 54 16	0 57 31	1 0 51	1 4 15
16	0 26 52	0 28 53	0 30 58	0 33 18	0 35 40	0 38 10	0 40 50	0 43 36	0 46 28	0 48 26	0 52 34	0 55 48	0 59 9	1 2 36	1 6 5
17	0 27 28	0 29 34	0 31 44	0 34 9	0 36 36	0 39 11	0 41 57	0 44 49	0 47 47	0 49 52	0 54 6	0 57 27	1 0 55	1 4 29	1 8 7
18	0 28 7	0 30 18	0 32 34	0 35 4	0 37 37	0 40 18	0 43 10	0 46 8	0 49 13	0 51 25	0 55 46	0 59 14	1 2 49	1 6 31	1 10 17
19	0 28 49	0 31 6	0 33 29	0 36 4	0 38 43	0 41 31	0 44 30	0 47 34	0 50 47	0 53 6	0 57 34	1 1 10	1 4 52	1 8 43	1 12 35
20	0 29 35	0 31 59	0 34 29	0 37 10	0 39 56	0 42 51	0 45 57	0 49 8	0 52 30	0 55 56	0 59 32	1 3 16	1 7 6	1 11 6	1 15 10
21	0 30 25	0 32 57	0 35 34	0 38 23	0 41 17	0 44 19	0 47 32	0 50 51	0 54 22	0 57 57	1 1 42	1 5 35	1 9 35	1 13 45	1 18 1
22	0 31 21	0 34 2	0 36 46	0 39 43	0 42 47	0 45 57	0 49 18	0 52 46	0 56 26	1 0 11	1 4 6	1 8 9	1 12 20	1 16 41	1 21 9
23	0 32 25	0 35 15	0 38 7	0 41 11	0 44 26	0 47 45	0 51 16	0 54 55	0 58 44	1 2 41	1 6 47	1 11 1	1 15 24	1 19 56	1 24 35

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 20 53	0 22 13	0 23 37	0 25 6	0 26 40	0 28 19	0 30 2	0 31 51	0 33 44	0 35 41	0 37 43	0 39 50	0 42 1	0 44 18	0 46 38
1	0 20 40	0 21 57	0 23 19	0 24 46	0 26 18	0 27 56	0 29 37	0 31 24	0 33 15	0 35 9	0 37 9	0 39 13	0 41 22	0 43 36	0 45 54
2	0 20 27	0 21 41	0 23 1	0 24 27	0 25 57	0 27 33	0 29 12	0 30 57	0 32 46	0 34 38	0 36 35	0 38 37	0 40 44	0 42 55	0 45 11
3	0 20 14	0 21 26	0 22 44	0 24 8	0 25 36	0 27 11	0 28 48	0 30 31	0 32 18	0 34 7	0 36 2	0 38 2	0 40 6	0 42 15	0 44 29
4	0 20 1	0 21 11	0 22 27	0 23 50	0 25 16	0 26 49	0 28 25	0 30 5	0 31 50	0 33 37	0 35 30	0 37 28	0 39 29	0 41 36	0 43 48
5	0 19 48	0 20 56	0 22 11	0 23 32	0 24 57	0 26 28	0 28 2	0 29 40	0 31 23	0 33 8	0 34 59	0 36 55	0 38 53	0 40 58	0 43 7
6	0 19 35	0 20 42	0 21 55	0 23 15	0 24 38	0 26 7	0 27 39	0 29 16	0 30 57	0 32 40	0 34 29	0 36 22	0 38 18	0 40 21	0 42 27
7	0 19 22	0 20 28	0 21 40	0 22 58	0 24 19	0 25 47	0 27 17	0 28 52	0 30 31	0 32 12	0 33 59	0 35 50	0 37 44	0 39 45	0 41 48
8	0 19 9	0 20 14	0 21 25	0 22 42	0 24 1	0 25 27	0 26 56	0 28 29	0 30 6	0 31 45	0 33 30	0 35 19	0 37 11	0 39 9	0 41 10
9	0 18 56	0 20 1	0 21 11	0 22 26	0 23 44	0 25 8	0 26 35	0 28 7	0 29 42	0 31 19	0 33 2	0 34 49	0 36 39	0 38 34	0 40 33
10	0 18 43	0 19 48	0 20 57	0 22 11	0 23 28	0 24 50	0 26 15	0 27 45	0 29 18	0 30 53	0 32 34	0 34 19	0 36 7	0 38 0	0 39 57
11	0 18 31	0 19 35	0 20 43	0 21 56	0 23 12	0 24 33	0 25 56	0 27 24	0 28 55	0 30 28	0 32 7	0 33 50	0 35 36	0 37 27	0 39 22
12	0 18 19	0 19 22	0 20 29	0 21 41	0 22 56	0 24 16	0 25 37	0 27 3	0 28 32	0 30 3	0 31 41	0 33 22	0 35 6	0 36 55	0 38 48
13	0 18 7	0 19 10	0 20 16	0 21 26	0 22 40	0 23 59	0 25 19	0 26 43	0 28 10	0 29 39	0 31 16	0 32 55	0 34 37	0 36 24	0 38 15
14	0 17 56	0 18 58	0 20 3	0 21 11	0 22 24	0 23 42	0 25 1	0 26 23	0 27 48	0 29 16	0 30 51	0 32 29	0 34 9	0 35 54	0 37 43
15	0 17 45	0 18 46	0 19 50	0 20 56	0 22 8	0 23 25	0 24 43	0 26 3	0 27 27	0 28 54	0 30 27	0 32 3	0 33 42	0 35 25	0 37 12
16	0 17 34	0 18 34	0 19 37	0 20 42	0 21 52	0 23 8	0 24 25	0 25 43	0 27 6	0 28 32	0 30 3	0 31 38	0 33 15	0 34 57	0 36 42
17	0 17 23	0 18 22	0 19 24	0 20 28	0 21 37	0 22 51	0 24 7	0 25 24	0 26 45	0 28 10	0 29 40	0 31 13	0 32 49	0 34 29	0 36 12
18	0 17 12	0 18 10	0 19 11	0 20 14	0 21 22	0 22 34	0 23 49	0 25 5	0 26 25	0 27 49	0 29 17	0 30 48	0 32 23	0 34 1	0 35 43
19	0 17 1	0 17 58	0 18 58	0 20 0	0 21 7	0 22 17	0 23 31	0 24 46	0 26 5	0 27 28	0 28 54	0 30 24	0 31 57	0 33 34	0 35 14
20	0 16 51	0 17 46	0 18 45	0 19 46	0 20 52	0 22 0	0 23 12	0 24 27	0 25 45	0 27 7	0 28 32	0 30 0	0 31 32	0 33 7	0 34 45
21	0 16 40	0 17 34	0 18 32	0 19 32	0 20 37	0 21 44	0 22 55	0 24 8	0 25 25	0 26 46	0 28 10	0 29 36	0 31 7	0 32 40	0 34 16
22	0 16 29	0 17 22	0 18 19	0 19 18	0 20 22	0 21 28	0 22 38	0 23 50	0 25 6	0 26 25	0 27 48	0 29 13	0 30 42	0 32 14	0 33 48
23	0 16 18	0 17 10	0 18 6	0 19 5	0 20 7	0 21 12	0 22 21	0 23 32	0 24 47	0 26 5	0 27 26	0 28 50	0 30 17	0 31 48	0 33 21

LATITUDE 39° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 49 4	0 51 34	0 54 10	0 56 49	0 59 32	1 2 23	1 5 13	1 8 11	1 11 13	1 14 20	1 17 31	1 20 50	1 24 5	1 27 29	1 30 58
1	0 49 56	0 52 29	0 55 8	0 57 50	1 0 37	1 3 31	1 6 25	1 9 26	1 12 32	1 15 43	1 18 58	1 22 20	1 25 41	1 29 9	1 32 42
2	0 50 49	0 53 26	0 56 8	0 58 54	1 1 45	1 4 41	1 7 40	1 10 45	1 13 55	1 17 10	1 20 29	1 23 54	1 27 21	1 30 53	1 34 30
3	0 51 45	0 54 25	0 57 10	1 0 0	1 2 55	1 5 54	1 8 58	1 12 7	1 15 21	1 18 40	1 22 3	1 25 31	1 29 4	1 32 41	1 36 23
4	0 52 43	0 55 27	0 58 16	1 1 9	1 4 8	1 7 11	1 10 19	1 13 33	1 16 51	1 20 14	1 23 41	1 27 13	1 30 51	1 34 33	1 38 20
5	0 53 44	0 56 32	0 59 25	1 2 22	1 5 24	1 8 32	1 11 45	1 15 3	1 18 26	1 21 53	1 25 25	1 29 3	1 32 45	1 36 31	1 40 23
6	0 54 49	0 57 40	1 0 36	1 3 38	1 6 44	1 9 56	1 13 14	1 16 37	1 20 5	1 23 37	1 27 14	1 30 57	1 34 44	1 38 35	1 42 32
7	0 55 57	0 58 51	1 1 51	1 4 58	1 8 9	1 11 25	1 14 47	1 18 15	1 21 48	1 25 26	1 29 8	1 32 56	1 36 49	1 40 46	1 44 48
8	0 57 9	1 0 7	1 3 11	1 6 23	1 9 39	1 12 59	1 16 26	1 19 58	1 23 37	1 27 22	1 31 10	1 35 3	1 39 1	1 43 4	1 47 12
9	0 58 24	1 1 27	1 4 36	1 7 53	1 11 14	1 14 39	1 18 11	1 21 49	1 25 33	1 29 23	1 33 18	1 37 16	1 41 19	1 45 29	1 49 43
10	0 59 44	1 2 52	1 6 7	1 9 29	1 12 55	1 16 26	1 20 4	1 23 49	1 27 38	1 31 31	1 35 33	1 39 36	1 43 45	1 48 1	1 52 22
11	1 1 8	1 4 21	1 7 42	1 11 10	1 14 42	1 18 19	1 22 3	1 25 54	1 29 49	1 33 47	1 37 55	1 42 5	1 46 21	1 50 43	1 55 10
12	1 2 38	1 5 56	1 9 22	1 12 56	1 16 35	1 20 18	1 24 7	1 28 3	1 32 4	1 36 10	1 40 24	1 44 42	1 49 6	1 53 34	1 58 8
13	1 4 14	1 7 37	1 11 8	1 14 48	1 18 33	1 22 23	1 26 18	1 30 19	1 34 26	1 38 40	1 43 0	1 47 28	1 52 0	1 56 36	2 1 18
14	1 5 57	1 9 28	1 13 6	1 16 51	1 20 42	1 24 38	1 28 40	1 32 48	1 37 3	1 41 24	1 45 52	1 50 27	1 55 6	1 59 51	2 4 41
15	1 7 47	1 11 25	1 15 11	1 19 4	1 23 2	1 27 5	1 31 15	1 35 32	1 39 55	1 44 24	1 49 0	1 53 42	1 58 28	2 3 21	2 8 18
16	1 9 45	1 13 30	1 17 24	1 21 23	1 25 29	1 29 41	1 33 59	1 38 26	1 42 56	1 47 33	1 52 16	1 57 6	2 2 2	2 7 3	2 12 10
17	1 11 51	1 15 44	1 19 47	1 23 55	1 28 8	1 32 28	1 36 56	1 41 30	1 46 11	1 50 57	1 55 49	2 0 48	2 5 53	2 11 4	2 16 20
18	1 14 45	1 18 13	1 22 22	1 26 38	1 31 1	1 35 30	1 40 7	1 44 50	1 49 39	1 54 35	1 59 37	2 4 46	2 10 1	2 15 21	2 20 48
19	1 16 38	1 20 49	1 25 8	1 29 35	1 34 8	1 38 47	1 43 33	1 48 25	1 53 25	1 58 33	2 3 46	2 9 4	2 14 29	2 20 1	2 25 38
20	1 19 26	1 23 49	1 28 17	1 32 49	1 37 31	1 42 22	1 47 19	1 52 23	1 57 33	2 2 50	2 8 13	2 13 42	2 19 19	2 25 5	2 30 54
21	1 22 24	1 26 55	1 31 36	1 36 22	1 41 16	1 46 18	1 51 26	1 56 40	2 2 2	2 7 33	2 13 8	2 18 48	2 24 37	2 30 35	2 36 37
22	1 25 44	1 30 26	1 35 17	1 40 18	1 45 24	1 50 36	1 55 57	2 1 26	2 7 0	2 12 40	2 18 28	2 24 25	2 30 28	2 36 36	2 42 51
23	1 29 23	1 34 18	1 39 21	1 44 34	1 49 54	1 55 20	2 0 54	2 6 37	2 12 26	2 18 21	2 24 23	2 30 33	2 36 51	2 43 15	2 49 44

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 49 4	0 51 34	0 54 10	0 56 49	0 59 32	1 2 23	1 5 13	1 8 11	1 11 13	1 14 20	1 17 31	1 20 50	1 24 5	1 27 29	1 30 58
1	0 48 16	0 50 42	0 53 13	0 55 48	0 58 28	1 1 16	1 4 2	1 6 57	1 9 55	1 12 57	1 16 5	1 19 20	1 22 32	1 25 53	1 29 18
2	0 47 29	0 49 51	0 52 18	0 54 50	0 57 27	1 0 11	1 2 54	1 5 46	1 8 40	1 11 38	1 14 43	1 17 54	1 21 3	1 24 20	1 27 42
3	0 46 44	0 49 2	0 51 26	0 53 55	0 56 29	0 59 9	1 1 49	1 4 38	1 7 28	1 10 23	1 13 25	1 16 32	1 19 38	1 22 51	1 26 9
4	0 46 0	0 48 15	0 50 36	0 53 2	0 55 33	0 58 10	1 0 47	1 3 33	1 6 19	1 9 11	1 12 11	1 15 14	1 18 17	1 21 25	1 24 39
5	0 45 17	0 47 30	0 49 48	0 52 11	0 54 39	0 57 13	0 59 48	1 2 31	1 5 13	1 8 2	1 10 59	1 13 58	1 16 58	1 20 2	1 23 12
6	0 44 35	0 46 46	0 49 2	0 51 22	0 53 47	0 56 18	0 58 51	1 1 31	1 4 10	1 6 56	1 9 50	1 12 45	1 15 42	1 18 42	1 21 48
7	0 43 54	0 46 3	0 48 17	0 50 35	0 52 57	0 55 25	0 57 56	1 0 33	1 3 9	1 5 52	1 8 42	1 11 35	1 14 28	1 17 25	1 20 27
8	0 43 14	0 45 21	0 47 33	0 49 49	0 52 9	0 54 34	0 57 2	0 59 36	1 2 10	1 4 50	1 7 36	1 10 26	1 13 16	1 16 10	1 19 9
9	0 42 35	0 44 40	0 46 50	0 49 4	0 51 22	0 53 44	0 56 9	0 58 40	1 1 13	1 3 50	1 6 32	1 9 19	1 12 6	1 14 57	1 17 53
10	0 41 57	0 44 0	0 46 8	0 48 20	0 50 36	0 52 55	0 55 18	0 57 46	1 0 17	1 2 51	1 5 29	1 8 12	1 10 58	1 13 46	1 16 39
11	0 41 20	0 43 21	0 45 27	0 47 37	0 49 51	0 52 7	0 54 28	0 56 54	0 59 23	1 1 53	1 4 28	1 7 8	1 9 51	1 12 37	1 15 27
12	0 40 44	0 42 43	0 44 47	0 46 55	0 49 7	0 51 20	0 53 39	0 56 3	0 58 29	1 0 56	1 3 29	1 6 6	1 8 46	1 11 30	1 14 17
13	0 40 9	0 42 6	0 44 8	0 46 14	0 48 24	0 50 34	0 52 51	0 55 13	0 57 36	1 0 0	1 2 32	1 5 6	1 7 43	1 10 25	1 13 9
14	0 39 35	0 41 30	0 43 30	0 45 34	0 47 42	0 49 49	0 52 4	0 54 24	0 56 44	0 59 6	1 1 36	1 4 7	1 6 41	1 9 21	1 12 2
15	0 39 2	0 40 55	0 42 53	0 44 55	0 47 0	0 49 5	0 51 18	0 53 36	0 55 53	0 58 13	1 0 41	1 3 9	1 5 40	1 8 18	1 10 56
16	0 38 30	0 40 21	0 42 17	0 44 16	0 46 19	0 48 22	0 50 33	0 52 48	0 55 3	0 57 21	0 59 47	1 2 12	1 4 40	1 7 16	1 9 51
17	0 37 59	0 39 48	0 41 41	0 43 38	0 45 39	0 47 40	0 49 49	0 52 1	0 54 14	0 56 30	0 58 53	1 1 16	1 3 42	1 6 15	1 8 48
18	0 37 28	0 39 15	0 41 6	0 43 1	0 45 0	0 46 59	0 49 6	0 51 15	0 53 26	0 55 40	0 58 0	1 0 21	1 2 45	1 5 15	1 7 46
19	0 36 57	0 38 43	0 40 32	0 42 25	0 44 21	0 46 19	0 48 23	0 50 30	0 52 39	0 54 51	0 57 8	0 59 27	1 1 49	1 4 16	1 6 45
20	0 36 27	0 38 11	0 39 58	0 41 49	0 43 43	0 45 40	0 47 41	0 49 46	0 51 53	0 54 3	0 56 17	0 58 34	1 0 54	1 3 18	1 5 45
21	0 35 57	0 37 39	0 39 24	0 41 14	0 43 6	0 45 1	0 47 0	0 49 2	0 51 7	0 53 15	0 55 27	0 57 42	1 0 0	1 2 21	1 4 45
22	0 35 27	0 37 7	0 38 51	0 40 39	0 42 29	0 44 22	0 46 19	0 48 19	0 50 22	0 52 28	0 54 37	0 56 50	0 59 6	1 1 25	1 3 46
23	0 34 57	0 36 36	0 38 18	0 40 4	0 41 52	0 43 44	0 45 39	0 47 36	0 49 37	0 51 41	0 53 48	0 55 59	0 58 13	1 0 29	1 2 48

LATITUDE 39° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 34 32	1 38 9	1 41 51	1 45 37	1 49 26	1 53 22	1 57 20	2 1 23	2 5 30	2 9 42	2 13 57	2 18 17	2 22 40	2 27 9	2 31 40
1	1 36 20	1 40 1	1 43 47	1 47 38	1 51 32	1 55 33	1 59 36	2 3 44	2 7 56	2 12 13	2 16 33	2 20 58	2 25 26	2 30 0	2 34 36
2	1 38 12	1 41 58	1 45 49	1 49 44	1 53 43	1 57 48	2 1 56	2 6 9	2 10 26	2 14 48	2 19 15	2 23 45	2 28 19	2 32 58	2 37 40
3	1 40 9	1 44 0	1 47 56	1 51 56	1 56 0	2 0 9	2 4 23	2 8 41	2 13 3	2 17 30	2 22 2	2 26 37	2 31 17	2 36 1	2 40 49
4	1 42 12	1 46 8	1 50 8	1 54 13	1 58 22	2 2 37	2 6 57	2 11 20	2 15 47	2 20 19	2 24 56	2 29 38	2 34 24	2 39 13	2 44 7
5	1 44 21	1 48 22	1 52 27	1 56 37	2 0 52	2 5 12	2 9 38	2 14 7	2 18 39	2 23 16	2 27 59	2 32 47	2 37 39	2 42 34	2 47 33
6	1 46 36	1 50 42	1 54 52	1 59 7	2 3 28	2 7 54	2 12 25	2 17 0	2 21 39	2 26 22	2 31 10	2 36 4	2 41 2	2 46 3	2 51 9
7	1 48 57	1 53 9	1 57 25	2 1 46	2 6 13	2 10 45	2 15 22	2 20 3	2 24 49	2 29 39	2 34 32	2 39 32	2 44 36	2 49 44	2 54 56
8	1 51 26	1 55 44	2 0 6	2 4 33	2 9 6	2 13 44	2 18 26	2 23 14	2 28 8	2 33 5	2 38 5	2 43 11	2 48 22	2 53 37	2 58 56
9	1 54 2	1 58 27	2 2 56	2 7 30	2 12 10	2 16 55	2 21 44	2 26 39	2 31 39	2 36 42	2 41 49	2 47 1	2 52 19	2 57 41	3 3 7
10	1 56 47	2 1 18	2 5 55	2 10 38	2 15 26	2 20 18	2 25 15	2 30 17	2 35 29	2 40 33	2 45 47	2 51 6	2 56 30	3 1 58	3 7 31
11	1 59 42	2 4 20	2 9 3	2 13 53	2 18 48	2 23 47	2 28 51	2 34 0	2 39 14	2 44 32	2 49 55	2 55 22	3 0 54	3 6 30	3 12 11
12	2 2 47	2 7 32	2 12 22	2 17 19	2 22 21	2 27 28	2 32 39	2 37 55	2 43 17	2 48 44	2 54 16	2 59 52	3 5 32	3 11 17	3 17 7
13	2 6 5	2 10 57	2 15 54	2 20 58	2 26 8	2 31 23	2 36 42	2 42 6	2 47 36	2 53 12	2 58 53	3 4 37	3 10 26	3 16 20	3 22 19
14	2 9 36	2 14 36	2 19 42	2 24 54	2 30 11	2 35 34	2 41 3	2 46 36	2 52 14	2 57 58	3 3 47	3 9 40	3 15 38	3 21 41	3 27 49
15	2 13 21	2 18 30	2 23 46	2 29 7	2 34 32	2 40 4	2 45 43	2 51 26	2 57 13	3 3 6	3 9 4	3 15 6	3 21 13	3 27 25	3 33 43
16	2 17 23	2 22 41	2 28 7	2 33 36	2 39 11	2 44 55	2 50 40	2 56 32	3 2 29	3 8 31	3 14 37	3 20 50	3 27 8	3 33 30	3 39 59
17	2 21 43	2 27 11	2 32 45	2 38 24	2 44 10	2 50 2	2 55 59	3 2 2	3 8 9	3 14 21	3 20 38	3 27 0	3 33 28	3 40 2	3 46 40
18	2 26 23	2 32 1	2 37 43	2 43 33	2 49 30	2 55 33	3 1 41	3 7 54	3 14 12	3 20 35	3 27 3	3 33 36	3 40 16	3 47 1	3 53 50
19	2 31 21	2 37 11	2 43 9	2 49 11	2 55 16	3 1 29	3 7 49	3 14 13	3 20 43	3 27 18	3 33 58	3 40 43	3 47 34	3 54 29	4 1 29
20	2 36 48	2 42 49	2 48 58	2 55 11	3 1 31	3 7 56	3 14 27	3 21 3	3 27 45	3 34 32	3 41 25	3 48 23	3 55 24	4 2 33	4 9 48
21	2 42 43	2 48 57	2 55 20	3 1 47	3 8 17	3 14 55	3 21 41	3 28 31	3 35 24	3 42 24	3 49 30	3 56 41	4 3 56	4 11 15	4 18 39
22	2 49 12	2 55 40	3 2 16	3 8 56	3 15 40	3 22 32	3 29 31	3 36 34	3 43 42	3 50 56	3 58 15	4 5 38	4 13 7	4 20 42	4 28 24
23	2 56 19	3 3 1	3 9 51	3 16 44	3 23 42	3 30 48	3 38 3	3 45 22	3 52 45	4 0 14	4 7 48	4 15 27	4 23 11	4 30 59	4 38 51

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 34 32	1 38 9	1 41 51	1 45 37	1 49 26	1 53 22	1 57 20	2 1 23	2 5 30	2 9 42	2 13 57	2 18 17	2 22 40	2 27 9	2 31 40
1	1 32 49	1 36 23	1 40 0	1 43 43	1 47 28	1 51 19	1 55 14	1 59 13	2 3 16	2 7 23	2 11 32	2 15 46	2 20 4	2 24 28	2 28 54
2	1 31 9	1 34 40	1 38 13	1 41 52	1 45 33	1 49 20	1 53 11	1 57 6	2 1 5	2 5 7	2 9 12	2 13 20	2 17 33	2 21 52	2 26 13
3	1 29 32	1 33 0	1 36 29	1 40 4	1 43 41	1 47 24	1 51 11	1 55 2	1 58 57	2 2 55	2 6 56	2 10 58	2 15 6	2 19 20	2 23 36
4	1 27 58	1 31 22	1 34 48	1 38 19	1 41 52	1 45 31	1 49 14	1 53 1	1 56 52	2 0 46	2 4 43	2 8 40	2 12 43	2 16 52	2 21 3
5	1 26 27	1 29 47	1 33 10	1 36 37	1 40 6	1 43 41	1 47 20	1 51 3	1 54 50	1 58 40	2 2 33	2 6 26	2 10 24	2 14 28	2 18 35
6	1 24 59	1 28 15	1 31 35	1 34 58	1 38 23	1 41 54	1 45 29	1 49 8	1 52 51	1 56 37	2 0 26	2 4 15	2 8 9	2 12 8	2 16 11
7	1 23 34	1 26 46	1 30 2	1 33 22	1 36 43	1 40 10	1 43 41	1 47 16	1 50 55	1 54 37	1 58 22	2 2 8	2 5 58	2 9 52	2 13 51
8	1 22 12	1 25 20	1 28 32	1 31 48	1 35 6	1 38 29	1 41 56	1 45 27	1 49 2	1 52 40	1 56 21	2 0 4	2 3 50	2 7 40	2 11 35
9	1 20 53	1 23 57	1 27 5	1 30 17	1 33 32	1 36 51	1 40 14	1 43 41	1 47 12	1 50 46	1 54 23	1 58 3	2 1 46	2 5 32	2 9 23
10	1 19 36	1 22 37	1 25 41	1 28 49	1 32 1	1 35 16	1 38 35	1 41 58	1 45 25	1 48 55	1 52 28	1 56 5	1 59 45	2 3 28	2 7 15
11	1 18 21	1 21 19	1 24 19	1 27 23	1 30 32	1 33 44	1 36 59	1 40 18	1 43 41	1 47 7	1 50 36	1 54 10	1 57 47	2 1 27	2 5 10
12	1 17 8	1 20 3	1 22 59	1 26 0	1 29 6	1 32 15	1 35 26	1 38 42	1 42 0	1 45 22	1 48 47	1 52 19	1 55 53	1 59 29	2 3 8
13	1 15 57	1 18 49	1 21 41	1 24 39	1 27 42	1 30 48	1 33 56	1 37 9	1 40 22	1 43 40	1 47 2	1 50 31	1 54 2	1 57 34	2 1 9
14	1 14 47	1 17 36	1 20 25	1 23 20	1 26 20	1 29 23	1 32 28	1 35 38	1 38 47	1 42 1	1 45 20	1 48 46	1 52 13	1 55 42	1 59 14
15	1 13 39	1 16 25	1 19 11	1 22 3	1 25 0	1 28 0	1 31 2	1 34 9	1 37 15	1 40 25	1 43 41	1 47 4	1 50 27	1 53 53	1 57 22
16	1 12 32	1 15 15	1 17 59	1 20 48	1 23 42	1 26 39	1 29 38	1 32 42	1 35 45	1 38 52	1 42 5	1 45 25	1 48 44	1 52 7	1 55 33
17	1 11 26	1 14 6	1 16 48	1 19 35	1 22 26	1 25 20	1 28 16	1 31 17	1 34 18	1 37 22	1 40 32	1 43 48	1 47 4	1 50 24	1 53 47
18	1 10 21	1 12 58	1 15 38	1 18 23	1 21 11	1 24 2	1 26 56	1 29 54	1 32 53	1 35 54	1 39 1	1 42 13	1 45 26	1 48 43	1 52 3
19	1 9 17	1 11 52	1 14 30	1 17 12	1 19 57	1 22 45	1 25 37	1 28 32	1 31 29	1 34 28	1 37 32	1 40 40	1 43 50	1 47 4	1 50 21
20	1 8 14	1 10 47	1 13 23	1 16 2	1 18 44	1 21 30	1 24 19	1 27 11	1 30 6	1 33 4	1 36 5	1 39 9	1 42 16	1 45 27	1 48 41
21	1 7 12	1 9 43	1 12 17	1 14 53	1 17 32	1 20 16	1 23 2	1 25 51	1 28 44	1 31 40	1 34 38	1 37 38	1 40 43	1 43 51	1 47 1
22	1 6 11	1 8 40	1 11 11	1 13 45	1 16 21	1 19 2	1 21 46	1 24 32	1 27 23	1 30 16	1 33 11	1 36 8	1 39 10	1 42 15	1 45 22
23	1 5 11	1 7 37	1 10 6	1 12 37	1 15 11	1 17 49	1 20 30	1 23 14	1 26 2	1 28 52	1 31 44	1 34 39	1 37 38	1 40 40	1 43 44

LATITUDE 40° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 28	0 10 35	0 10 47	0 11 3	0 11 24	0 11 50	0 12 21	0 12 56	0 13 35	0 14 20	0 15 8	0 16 3	0 17 1	0 18 4	0 19 12
1	0 10 29	0 10 36	0 10 49	0 11 5	0 11 27	0 11 53	0 12 25	0 13 1	0 13 41	0 14 27	0 15 16	0 16 12	0 17 11	0 18 15	0 19 23
2	0 10 30	0 10 38	0 10 51	0 11 7	0 11 30	0 11 56	0 12 29	0 13 6	0 13 47	0 14 34	0 15 24	0 16 21	0 17 21	0 18 26	0 19 35
3	0 10 31	0 10 40	0 10 53	0 11 9	0 11 33	0 11 59	0 12 33	0 13 11	0 13 53	0 14 41	0 15 32	0 16 31	0 17 32	0 18 38	0 19 48
4	0 10 33	0 10 42	0 10 55	0 11 11	0 11 36	0 12 3	0 12 37	0 13 16	0 13 59	0 14 49	0 15 41	0 16 41	0 17 43	0 18 50	0 20 2
5	0 10 35	0 10 44	0 10 57	0 11 13	0 11 39	0 12 7	0 12 41	0 13 22	0 14 5	0 14 57	0 15 50	0 16 51	0 17 54	0 19 3	0 20 17
6	0 10 37	0 10 46	0 10 59	0 11 16	0 11 42	0 12 11	0 12 46	0 13 28	0 14 12	0 15 5	0 15 59	0 17 2	0 18 6	0 19 17	0 20 33
7	0 10 39	0 10 48	0 11 1	0 11 19	0 11 45	0 12 15	0 12 51	0 13 34	0 14 19	0 15 13	0 16 8	0 17 13	0 18 19	0 19 32	0 20 50
8	0 10 41	0 10 50	0 11 3	0 11 22	0 11 48	0 12 19	0 12 56	0 13 40	0 14 26	0 15 21	0 16 18	0 17 24	0 18 32	0 19 47	0 21 8
9	0 10 43	0 10 52	0 11 5	0 11 25	0 11 52	0 12 23	0 13 1	0 13 46	0 14 33	0 15 29	0 16 28	0 17 36	0 18 46	0 20 3	0 21 27
10	0 10 45	0 10 54	0 11 8	0 11 28	0 11 56	0 12 27	0 13 6	0 13 52	0 14 40	0 15 37	0 16 38	0 17 46	0 19 1	0 20 20	0 21 47
11	0 10 47	0 10 56	0 11 10	0 11 31	0 12 0	0 12 32	0 13 12	0 13 59	0 14 48	0 15 46	0 16 49	0 18 1	0 19 17	0 20 38	0 22 8
12	0 10 49	0 10 58	0 11 12	0 11 34	0 12 4	0 12 37	0 13 18	0 14 6	0 14 56	0 15 56	0 17 1	0 18 15	0 19 34	0 20 57	0 22 30
13	0 10 51	0 11 0	0 11 14	0 11 37	0 12 8	0 12 42	0 13 25	0 14 14	0 15 5	0 16 6	0 17 14	0 18 30	0 19 52	0 21 17	0 22 53
14	0 10 53	0 11 2	0 11 16	0 11 40	0 12 12	0 12 47	0 13 32	0 14 22	0 15 15	0 16 17	0 17 28	0 18 46	0 20 11	0 21 38	0 23 17
15	0 10 55	0 11 4	0 11 18	0 11 43	0 12 16	0 12 52	0 13 39	0 14 31	0 15 26	0 16 29	0 17 43	0 19 6	0 20 31	0 22 0	0 23 42
16	0 10 56	0 11 6	0 11 20	0 11 46	0 12 20	0 12 58	0 13 46	0 14 40	0 15 37	0 16 42	0 17 59	0 19 21	0 20 52	0 22 24	0 24 9
17	0 10 57	0 11 8	0 11 22	0 11 49	0 12 24	0 13 4	0 13 53	0 14 49	0 15 48	0 16 56	0 18 16	0 19 40	0 21 14	0 22 50	0 24 38
18	0 10 58	0 11 10	0 11 25	0 11 52	0 12 28	0 13 10	0 14 0	0 14 58	0 16 0	0 17 11	0 18 34	0 20 0	0 21 37	0 23 18	0 25 9
19	0 10 59	0 11 11	0 11 28	0 11 56	0 12 32	0 13 16	0 14 8	0 15 8	0 16 13	0 17 27	0 18 53	0 20 22	0 22 1	0 23 48	0 25 43
20	0 11 0	0 11 12	0 11 31	0 12 0	0 12 37	0 13 23	0 14 16	0 15 19	0 16 27	0 17 45	0 19 14	0 20 46	0 22 28	0 24 20	0 26 20
21	0 11 1	0 11 13	0 11 33	0 12 4	0 12 42	0 13 30	0 14 25	0 15 31	0 16 42	0 18 4	0 19 36	0 21 13	0 22 58	0 24 55	0 27 0
22	0 11 2	0 11 15	0 11 36	0 12 9	0 12 48	0 13 38	0 14 35	0 15 45	0 16 59	0 18 25	0 20 0	0 21 42	0 23 33	0 25 34	0 27 44
23	0 11 3	0 11 17	0 11 39	0 12 14	0 12 55	0 13 46	0 14 47	0 16 0	0 17 19	0 18 50	0 20 28	0 22 15	0 24 12	0 26 18	0 28 34

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 28	0 10 35	0 10 47	0 11 3	0 11 24	0 11 50	0 12 21	0 12 56	0 13 35	0 14 20	0 15 8	0 16 3	0 17 1	0 18 4	0 19 12
1	0 10 26	0 10 33	0 10 45	0 11 1	0 11 21	0 11 47	0 12 15	0 12 52	0 13 29	0 14 13	0 15 1	0 15 54	0 16 52	0 17 54	0 19 0
2	0 10 24	0 10 31	0 10 43	0 10 59	0 11 18	0 11 44	0 12 12	0 12 48	0 13 23	0 14 7	0 14 54	0 15 46	0 16 43	0 17 44	0 18 48
3	0 10 22	0 10 29	0 10 41	0 10 57	0 11 15	0 11 41	0 12 8	0 12 44	0 13 17	0 14 1	0 14 47	0 15 38	0 16 34	0 17 34	0 18 37
4	0 10 20	0 10 27	0 10 39	0 10 54	0 11 12	0 11 38	0 12 4	0 12 39	0 13 12	0 13 55	0 14 40	0 15 30	0 16 25	0 17 24	0 18 26
5	0 10 18	0 10 25	0 10 37	0 10 51	0 11 9	0 11 35	0 12 0	0 12 34	0 13 7	0 13 49	0 14 33	0 15 22	0 16 16	0 17 14	0 18 15
6	0 10 16	0 10 23	0 10 35	0 10 48	0 11 6	0 11 31	0 11 56	0 12 29	0 13 2	0 13 43	0 14 26	0 15 14	0 16 7	0 17 4	0 18 4
7	0 10 14	0 10 21	0 10 32	0 10 45	0 11 3	0 11 27	0 11 52	0 12 24	0 12 57	0 13 37	0 14 19	0 15 6	0 15 58	0 16 54	0 17 53
8	0 10 12	0 10 19	0 10 29	0 10 42	0 11 0	0 11 23	0 11 48	0 12 19	0 12 52	0 13 31	0 14 12	0 14 58	0 15 49	0 16 44	0 17 42
9	0 10 10	0 10 16	0 10 26	0 10 39	0 10 57	0 11 19	0 11 44	0 12 14	0 12 47	0 13 25	0 14 5	0 14 51	0 15 40	0 16 34	0 17 31
10	0 10 7	0 10 13	0 10 23	0 10 36	0 10 54	0 11 15	0 11 40	0 12 9	0 12 42	0 13 19	0 13 59	0 14 44	0 15 32	0 16 24	0 17 20
11	0 10 4	0 10 10	0 10 20	0 10 33	0 10 50	0 11 11	0 11 36	0 12 4	0 12 37	0 13 13	0 13 53	0 14 37	0 15 23	0 16 14	0 17 10
12	0 10 1	0 10 7	0 10 17	0 10 30	0 10 46	0 11 7	0 11 32	0 11 59	0 12 32	0 13 7	0 13 47	0 14 30	0 15 14	0 16 5	0 16 0
13	0 9 58	0 10 4	0 10 14	0 10 27	0 10 42	0 11 3	0 11 28	0 11 54	0 12 27	0 13 1	0 13 40	0 14 23	0 15 5	0 15 56	0 17 50
14	0 9 55	0 10 1	0 10 11	0 10 24	0 10 38	0 10 59	0 11 24	0 11 49	0 12 22	0 12 55	0 13 33	0 14 16	0 14 57	0 15 47	0 16 40
15	0 9 52	0 9 58	0 10 8	0 10 20	0 10 34	0 10 55	0 11 19	0 11 44	0 12 16	0 12 49	0 13 26	0 14 9	0 14 49	0 15 38	0 16 30
16	0 9 49	0 9 55	0 10 4	0 10 16	0 10 30	0 10 51	0 11 14	0 11 39	0 12 10	0 12 43	0 13 19	0 14 1	0 14 41	0 15 29	0 16 20
17	0 9 46	0 9 52	0 10 0	0 10 12	0 10 26	0 10 47	0 11 9	0 11 34	0 12 4	0 12 37	0 13 12	0 13 53	0 14 33	0 15 20	0 16 10
18	0 9 43	0 9 48	0 9 56	0 10 8	0 10 22	0 10 42	0 11 4	0 11 29	0 11 58	0 12 31	0 13 5	0 13 45	0 14 25	0 15 11	0 16 0
19	0 9 39	0 9 44	0 9 52	0 10 4	0 10 18	0 10 37	0 10 59	0 11 24	0 11 52	0 12 24	0 12 58	0 13 37	0 14 17	0 15 2	0 15 50
20	0 9 35	0 9 40	0 9 48	0 10 0	0 10 14	0 10 32	0 10 54	0 11 18	0 11 46	0 12 17	0 12 51	0 13 29	0 14 9	0 14 53	0 15 41
21	0 9 31	0 9 36	0 9 44	0 9 55	0 10 9	0 10 27	0 10 49	0 11 12	0 11 40	0 12 10	0 12 44	0 13 21	0 14 1	0 14 44	0 15 31
22	0 9 27	0 9 32	0 9 39	0 9 50	0 10 4	0 10 22	0 10 43	0 11 6	0 11 33	0 12 3	0 12 36	0 13 13	0 13 52	0 14 35	0 15 21
23	0 9 22	0 9 27	0 9 34	0 9 45	0 9 58	0 10 16	0 10 37	0 11 0	0 11 26	0 11 56	0 12 28	0 13 4	0 13 43	0 14 25	0 15 10

LATITUDE 40° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 20 23	0 21 40	0 23 3	0 24 28	0 25 59	0 27 34	0 29 14	0 30 59	0 32 48	0 34 41	0 36 39	0 38 41	0 40 48	0 43 0	0 45 16
1	0 20 36	0 21 55	0 23 19	0 24 47	0 26 20	0 27 57	0 29 40	0 31 27	0 33 19	0 35 14	0 37 13	0 39 19	0 41 29	0 43 44	0 46 2
2	0 20 49	0 22 11	0 23 36	0 25 7	0 26 42	0 28 21	0 30 7	0 31 56	0 33 51	0 35 48	0 37 49	0 39 58	0 42 11	0 44 29	0 46 49
3	0 21 4	0 22 28	0 23 55	0 25 28	0 27 5	0 28 47	0 30 35	0 32 26	0 34 24	0 36 23	0 38 26	0 40 38	0 42 54	0 45 15	0 47 38
4	0 21 20	0 22 46	0 24 15	0 25 50	0 27 29	0 29 14	0 31 4	0 32 57	0 34 58	0 36 59	0 39 5	0 41 20	0 43 39	0 46 3	0 48 30
5	0 21 37	0 23 5	0 24 36	0 26 13	0 27 54	0 29 42	0 31 34	0 33 29	0 35 33	0 37 37	0 39 46	0 42 4	0 44 26	0 46 53	0 49 24
6	0 21 55	0 23 25	0 24 58	0 26 37	0 28 20	0 30 11	0 32 5	0 34 2	0 36 9	0 38 16	0 40 29	0 42 50	0 45 15	0 47 45	0 50 20
7	0 22 14	0 23 46	0 25 21	0 27 2	0 28 48	0 30 41	0 32 37	0 34 37	0 36 47	0 38 57	0 41 14	0 43 38	0 46 7	0 48 40	0 51 18
8	0 22 34	0 24 8	0 25 45	0 27 28	0 29 17	0 31 12	0 33 11	0 35 14	0 37 27	0 39 41	0 42 2	0 44 29	0 47 2	0 49 38	0 52 20
9	0 22 55	0 24 31	0 26 10	0 27 56	0 29 48	0 31 45	0 33 47	0 35 54	0 38 10	0 40 28	0 42 53	0 45 23	0 48 0	0 50 40	0 53 26
10	0 23 17	0 24 55	0 26 36	0 28 26	0 30 21	0 32 20	0 34 26	0 36 37	0 38 56	0 41 18	0 43 47	0 46 20	0 49 1	0 51 46	0 54 36
11	0 23 40	0 25 20	0 27 4	0 28 57	0 30 55	0 32 57	0 35 7	0 37 22	0 39 45	0 42 11	0 44 44	0 47 21	0 50 6	0 52 55	0 55 49
12	0 24 4	0 25 47	0 27 34	0 29 30	0 31 31	0 33 37	0 35 51	0 38 10	0 40 37	0 43 7	0 45 44	0 48 26	0 51 15	0 54 8	0 57 5
13	0 24 30	0 26 16	0 28 6	0 30 5	0 32 9	0 34 19	0 36 37	0 39 1	0 41 32	0 44 7	0 46 48	0 49 35	0 52 28	0 55 26	0 58 27
14	0 24 57	0 26 46	0 28 40	0 30 43	0 32 50	0 35 4	0 37 26	0 39 55	0 42 30	0 45 10	0 47 56	0 50 48	0 53 45	0 56 49	0 59 55
15	0 25 26	0 27 18	0 29 16	0 31 23	0 33 34	0 35 52	0 38 18	0 40 52	0 43 32	0 46 17	0 49 8	0 52 5	0 55 7	0 58 17	1 1 30
16	0 25 57	0 27 52	0 29 55	0 32 5	0 34 21	0 36 43	0 39 14	0 41 53	0 44 38	0 47 28	0 50 24	0 53 27	0 56 35	0 59 51	1 3 14
17	0 26 30	0 28 28	0 30 36	0 32 50	0 35 11	0 37 38	0 40 14	0 42 58	0 45 49	0 48 44	0 51 46	0 54 55	0 58 9	1 1 32	1 5 8
18	0 27 5	0 29 7	0 31 20	0 33 39	0 36 5	0 38 38	0 41 19	0 44 8	0 47 5	0 50 6	0 53 14	0 56 30	0 59 51	1 3 21	1 7 14
19	0 27 43	0 29 50	0 32 8	0 34 33	0 37 4	0 39 43	0 42 30	0 45 24	0 48 27	0 51 35	0 54 50	0 58 13	1 1 42	1 5 20	1 9 3
20	0 28 25	0 30 37	0 33 1	0 35 32	0 38 9	0 40 54	0 43 47	0 46 47	0 49 56	0 53 12	0 56 35	1 0 6	1 3 43	1 7 29	1 11 21
21	0 29 11	0 31 29	0 33 58	0 36 36	0 39 20	0 42 11	0 45 11	0 48 19	0 51 35	0 54 59	0 58 30	1 2 9	1 5 55	1 9 50	1 13 48
22	0 30 2	0 32 27	0 35 1	0 37 46	0 40 38	0 43 36	0 46 44	0 50 0	0 53 25	0 56 58	1 0 37	1 4 25	1 8 20	1 12 25	1 16 34
23	0 30 59	0 33 31	0 36 12	0 39 3	0 42 5	0 45 11	0 48 27	0 51 52	0 55 27	0 59 10	1 2 57	1 6 57	1 11 2	1 15 16	1 19 40

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 20 23	0 21 40	0 23 2	0 24 28	0 25 59	0 27 34	0 29 14	0 30 59	0 32 48	0 34 41	0 36 39	0 38 41	0 40 48	0 43 0	0 45 16
1	0 20 10	0 21 26	0 22 46	0 24 10	0 25 39	0 27 13	0 28 51	0 30 34	0 32 20	0 34 11	0 36 7	0 38 7	0 40 11	0 42 20	0 44 32
2	0 19 57	0 21 12	0 22 30	0 23 52	0 25 20	0 26 52	0 28 28	0 30 9	0 31 53	0 33 41	0 35 36	0 37 33	0 39 35	0 41 41	0 43 50
3	0 19 44	0 20 58	0 22 14	0 23 35	0 25 1	0 26 31	0 28 5	0 29 44	0 31 27	0 33 12	0 35 5	0 37 0	0 39 0	0 41 3	0 43 10
4	0 19 32	0 20 44	0 21 58	0 23 18	0 24 42	0 26 11	0 27 43	0 29 20	0 31 1	0 32 44	0 34 35	0 36 28	0 38 25	0 40 26	0 42 31
5	0 19 20	0 20 30	0 21 43	0 23 1	0 24 24	0 25 51	0 27 21	0 28 56	0 30 36	0 32 17	0 34 5	0 35 56	0 37 51	0 39 50	0 41 53
6	0 19 8	0 20 16	0 21 28	0 22 45	0 24 6	0 25 31	0 27 0	0 28 33	0 30 11	0 31 50	0 33 36	0 35 25	0 37 18	0 39 15	0 41 16
7	0 18 56	0 20 3	0 21 13	0 22 29	0 23 48	0 25 12	0 26 39	0 28 10	0 29 47	0 31 24	0 33 8	0 34 55	0 36 46	0 38 41	0 40 40
8	0 18 44	0 19 50	0 20 59	0 22 13	0 23 31	0 24 53	0 26 19	0 27 48	0 29 23	0 30 59	0 32 41	0 34 26	0 36 15	0 38 8	0 40 5
9	0 18 32	0 19 37	0 20 45	0 21 58	0 23 14	0 24 35	0 25 59	0 27 27	0 29 0	0 30 35	0 32 15	0 33 58	0 35 45	0 37 36	0 39 31
10	0 18 20	0 19 24	0 20 31	0 21 43	0 22 58	0 24 17	0 25 40	0 27 7	0 28 37	0 30 12	0 31 50	0 33 31	0 35 16	0 37 5	0 38 58
11	0 18 9	0 19 12	0 20 18	0 21 29	0 22 42	0 24 0	0 25 22	0 26 48	0 28 16	0 29 50	0 31 26	0 33 5	0 34 48	0 36 35	0 38 26
12	0 17 58	0 19 0	0 20 5	0 21 15	0 22 26	0 23 43	0 25 4	0 26 29	0 27 55	0 29 28	0 31 2	0 32 39	0 34 21	0 36 6	0 37 55
13	0 17 47	0 18 48	0 19 52	0 21 1	0 22 11	0 23 26	0 24 46	0 26 10	0 27 34	0 29 6	0 30 38	0 32 14	0 33 54	0 35 37	0 37 24
14	0 17 36	0 18 36	0 19 39	0 20 47	0 21 56	0 23 9	0 24 28	0 25 51	0 27 13	0 28 44	0 30 14	0 31 49	0 33 28	0 35 9	0 36 54
15	0 17 24	0 18 24	0 19 26	0 20 33	0 21 41	0 22 53	0 24 10	0 25 32	0 26 53	0 28 22	0 29 51	0 31 24	0 33 2	0 34 41	0 36 24
16	0 17 13	0 18 12	0 19 13	0 20 19	0 21 26	0 22 37	0 23 52	0 25 13	0 26 33	0 28 0	0 29 28	0 30 59	0 32 36	0 34 13	0 35 54
17	0 17 2	0 18 0	0 19 0	0 20 5	0 21 11	0 22 21	0 23 34	0 24 54	0 26 13	0 27 38	0 29 5	0 30 35	0 32 10	0 33 46	0 35 25
18	0 16 51	0 17 48	0 18 47	0 19 51	0 20 56	0 22 5	0 23 17	0 24 35	0 25 53	0 27 16	0 28 42	0 30 11	0 31 44	0 33 19	0 34 56
19	0 16 41	0 17 36	0 18 34	0 19 37	0 20 41	0 21 49	0 23 0	0 24 16	0 25 33	0 26 54	0 28 19	0 29 47	0 31 18	0 32 52	0 34 28
20	0 16 31	0 17 25	0 18 22	0 19 23	0 20 26	0 21 33	0 22 43	0 23 57	0 25 13	0 26 33	0 27 56	0 29 23	0 30 52	0 32 25	0 34 0
21	0 16 20	0 17 13	0 18 9	0 19 9	0 20 11	0 21 17	0 22 26	0 23 38	0 24 53	0 26 12	0 27 33	0 28 59	0 30 26	0 31 58	0 33 32
22	0 16 9	0 17 1	0 17 56	0 18 55	0 19 56	0 21 1	0 22 9	0 23 19	0 24 33	0 25 51	0 27 11	0 28 35	0 30 1	0 31 31	0 33 4
23	0 15 58	0 16 49	0 17 43	0 18 41	0 19 41	0 20 45	0 21 51	0 23 1	0 24 14	0 25 30	0 26 49	0 28 11	0 29 36	0 31 4	0 32 36

LATITUDE 40° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 47 37	0 50 2	0 52 31	0 55 5	0 57 43	1 0 26	1 3 13	1 6 5	1 9 1	1 12 1	1 15 6	1 18 14	1 21 27	1 24 45	1 28 7
1	0 48 25	0 50 53	0 53 25	0 56 2	0 58 43	1 1 29	1 4 19	1 7 15	1 10 15	1 13 18	1 16 26	1 19 39	1 22 56	1 26 18	1 29 44
2	0 49 15	0 51 46	0 54 21	0 57 2	0 59 46	1 2 35	1 5 29	1 8 29	1 11 33	1 14 39	1 17 51	1 21 8	1 24 29	1 27 55	1 31 25
3	0 50 7	0 52 41	0 55 20	0 58 4	1 0 52	1 3 45	1 6 43	1 9 46	1 12 53	1 16 4	1 19 20	1 22 42	1 26 7	1 29 36	1 33 10
4	0 51 2	0 53 39	0 56 22	0 59 9	1 2 1	1 4 58	1 8 0	1 11 6	1 14 17	1 17 33	1 20 53	1 24 20	1 27 49	1 31 22	1 35 0
5	0 52 0	0 54 41	0 57 27	1 0 18	1 3 14	1 6 15	1 9 21	1 12 31	1 15 46	1 19 6	1 22 31	1 26 0	1 29 34	1 33 12	1 36 56
6	0 52 59	0 55 44	0 58 34	1 1 29	1 4 29	1 7 35	1 10 45	1 13 59	1 17 18	1 20 43	1 24 13	1 27 47	1 31 26	1 35 8	1 38 56
7	0 54 1	0 56 50	0 59 44	1 2 43	1 5 47	1 8 57	1 12 12	1 15 31	1 18 54	1 22 24	1 25 58	1 29 37	1 33 21	1 37 8	1 41 1
8	0 55 7	0 58 0	1 0 58	1 4 1	1 7 9	1 10 23	1 13 42	1 17 6	1 20 34	1 24 8	1 27 47	1 31 31	1 35 20	1 39 14	1 43 12
9	0 56 17	0 59 13	1 2 16	1 5 24	1 8 36	1 11 54	1 15 18	1 18 47	1 22 21	1 26 0	1 29 44	1 33 33	1 37 27	1 41 27	1 45 31
10	0 57 34	1 0 33	1 3 40	1 6 53	1 10 11	1 13 32	1 17 1	1 20 36	1 24 16	1 28 0	1 31 49	1 35 44	1 39 44	1 43 50	1 48 0
11	0 58 52	1 1 56	1 5 8	1 8 26	1 11 49	1 15 16	1 18 50	1 22 30	1 26 16	1 30 6	1 34 1	1 38 2	1 42 8	1 46 20	1 50 36
12	1 0 12	1 3 23	1 6 41	1 10 4	1 13 32	1 17 5	1 20 44	1 24 30	1 28 21	1 32 17	1 36 19	1 40 26	1 44 39	1 48 57	1 53 20
13	1 1 38	1 4 55	1 8 18	1 11 46	1 15 20	1 18 59	1 22 44	1 26 36	1 30 33	1 34 36	1 38 44	1 42 58	1 47 17	1 51 41	1 56 11
14	1 3 11	1 6 34	1 10 2	1 13 36	1 17 16	1 21 2	1 24 53	1 28 52	1 32 56	1 37 5	1 41 20	1 45 41	1 50 7	1 54 38	1 59 15
15	1 4 52	1 8 21	1 11 55	1 15 35	1 19 22	1 23 15	1 27 14	1 31 19	1 35 30	1 39 46	1 44 9	1 48 38	1 53 12	1 57 50	2 2 34
16	1 6 43	1 10 18	1 13 59	1 17 47	1 21 41	1 25 42	1 29 48	1 34 0	1 38 18	1 42 42	1 47 8	1 51 45	1 56 25	2 1 14	2 6 7
17	1 8 36	1 12 16	1 16 6	1 20 1	1 24 2	1 28 10	1 32 22	1 36 44	1 41 9	1 45 41	1 50 20	1 55 3	1 59 55	2 4 51	2 9 52
18	1 10 40	1 14 29	1 18 24	1 22 27	1 26 37	1 30 51	1 35 15	1 39 46	1 44 17	1 48 58	1 53 45	1 58 39	2 3 38	2 8 44	2 13 52
19	1 12 52	1 16 47	1 20 57	1 25 8	1 29 24	1 33 46	1 38 18	1 42 57	1 47 41	1 52 31	1 57 27	2 2 30	2 7 39	2 12 54	2 18 14
20	1 15 20	1 19 26	1 23 40	1 28 1	1 32 28	1 37 2	1 41 42	1 46 29	1 51 23	1 56 23	2 1 30	2 6 43	2 12 2	2 17 28	2 22 59
21	1 17 57	1 22 14	1 26 38	1 31 8	1 35 45	1 40 29	1 45 21	1 50 20	1 55 25	2 0 34	2 5 51	2 11 15	2 16 46	2 22 23	2 28 6
22	1 20 52	1 25 20	1 29 54	1 34 35	1 39 23	1 44 19	1 49 21	1 54 28	1 59 44	2 5 9	2 10 39	2 16 14	2 21 56	2 27 45	2 33 40
23	1 24 10	1 28 45	1 33 31	1 38 24	1 43 24	1 48 31	1 53 44	1 59 4	2 4 32	2 10 7	2 15 50	2 21 40	2 27 36	2 33 39	2 39 48

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 47 37	0 50 2	0 52 31	0 55 5	0 57 42	1 0 26	1 3 13	1 6 5	1 9 1	1 12 1	1 15 6	1 18 14	1 21 27	1 24 45	1 28 7
1	0 46 50	0 49 12	0 51 37	0 54 8	0 56 41	0 59 21	1 2 5	1 4 54	1 7 47	1 10 44	1 13 46	1 16 51	1 20 0	1 23 13	1 26 31
2	0 46 5	0 48 24	0 50 45	0 53 13	0 55 43	0 58 19	1 1 0	1 3 46	1 6 36	1 9 30	1 12 29	1 15 31	1 18 36	1 21 45	1 24 59
3	0 45 22	0 47 38	0 49 56	0 52 21	0 54 48	0 57 20	0 59 58	1 2 41	1 5 28	1 8 19	1 11 15	1 14 14	1 17 16	1 20 21	1 23 31
4	0 44 40	0 46 53	0 49 9	0 51 31	0 53 55	0 56 24	0 58 59	1 1 39	1 4 23	1 7 11	1 10 4	1 13 0	1 15 59	1 19 1	1 22 7
5	0 44 0	0 46 10	0 48 24	0 50 43	0 53 5	0 55 31	0 58 3	1 0 40	1 3 21	1 6 6	1 8 56	1 11 49	1 14 45	1 17 44	1 20 47
6	0 43 21	0 45 29	0 47 41	0 49 57	0 52 17	0 54 40	0 57 9	0 59 43	1 2 22	1 5 4	1 7 51	1 10 40	1 13 33	1 16 29	1 19 29
7	0 42 43	0 44 49	0 46 59	0 49 13	0 51 31	0 53 52	0 56 18	0 58 49	1 1 25	1 4 4	1 6 47	1 9 33	1 12 23	1 15 16	1 18 13
8	0 42 6	0 44 10	0 46 18	0 48 30	0 50 46	0 53 5	0 55 28	0 57 56	1 0 29	1 3 5	1 5 45	1 8 28	1 11 15	1 14 5	1 16 59
9	0 41 30	0 43 32	0 45 38	0 47 48	0 50 2	0 52 19	0 54 40	0 57 5	0 59 35	1 2 8	1 4 45	1 7 25	1 10 9	1 12 56	1 15 47
10	0 40 55	0 42 55	0 44 59	0 47 7	0 49 19	0 51 34	0 53 53	0 56 16	0 58 43	1 1 13	1 3 47	1 6 24	1 9 5	1 11 49	1 14 37
11	0 40 21	0 42 19	0 44 21	0 46 27	0 48 37	0 50 50	0 53 6	0 55 27	0 57 52	1 0 19	1 2 50	1 5 24	1 8 1	1 10 42	1 13 27
12	0 39 48	0 41 44	0 43 44	0 45 48	0 47 55	0 50 6	0 52 20	0 54 38	0 57 2	0 59 26	1 1 54	1 4 25	1 6 59	1 9 37	1 12 19
13	0 39 15	0 41 10	0 43 8	0 45 10	0 47 14	0 49 23	0 51 35	0 53 50	0 56 13	0 58 34	1 0 59	1 3 27	1 5 59	1 8 34	1 11 13
14	0 38 43	0 40 36	0 42 32	0 44 32	0 46 34	0 48 41	0 50 51	0 53 3	0 55 24	0 57 43	1 0 5	1 2 31	1 5 1	1 7 33	1 10 9
15	0 38 11	0 40 2	0 41 57	0 43 55	0 45 54	0 47 59	0 50 7	0 52 17	0 54 36	0 56 53	0 59 12	1 1 36	1 4 4	1 6 34	1 9 7
16	0 37 40	0 39 29	0 41 22	0 43 18	0 45 15	0 47 18	0 49 24	0 51 32	0 53 48	0 56 3	0 58 20	1 0 42	1 3 8	1 5 36	1 8 7
17	0 37 9	0 38 56	0 40 47	0 42 41	0 44 36	0 46 37	0 48 41	0 50 47	0 53 1	0 55 14	0 57 29	0 59 49	1 2 13	1 4 38	1 7 7
18	0 36 39	0 38 24	0 40 13	0 42 5	0 43 58	0 45 57	0 47 59	0 50 3	0 52 14	0 54 25	0 56 39	0 58 56	1 1 18	1 3 41	1 6 8
19	0 36 9	0 37 52	0 39 39	0 41 29	0 43 21	0 45 18	0 47 18	0 49 20	0 51 28	0 53 37	0 55 49	0 58 4	1 0 24	1 2 45	1 5 10
20	0 35 39	0 37 20	0 39 5	0 40 53	0 42 44	0 44 39	0 46 37	0 48 37	0 50 42	0 52 50	0 55 0	0 57 13	0 59 30	1 1 50	1 4 13
21	0 35 9	0 36 49	0 38 32	0 40 18	0 42 8	0 44 0	0 45 56	0 47 55	0 49 57	0 52 4	0 54 12	0 56 23	0 58 38	1 0 56	1 3 16
22	0 34 39	0 36 18	0 38 0	0 39 44	0 41 32	0 43 22	0 45 16	0 47 13	0 49 13	0 51 18	0 53 25	0 55 34	0 57 46	1 0 2	1 2 20
23	0 34 10	0 35 48	0 37 28	0 39 11	0 40 57	0 42 45	0 44 37	0 46 32	0 48 30	0 50 33	0 52 38	0 54 45	0 56 55	0 59 9	1 1 25

LATITUDE 40° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 31 32	1 35 3	1 38 38	1 42 16	1 45 58	1 49 46	1 53 36	1 57 32	2 1 31	2 5 34	2 9 41	2 13 53	2 18 7	2 22 27	2 26 50
1	1 33 14	1 36 49	1 40 28	1 44 10	1 47 57	1 51 49	1 55 45	1 59 45	2 3 49	2 7 56	2 12 8	2 16 25	2 20 45	2 25 9	2 29 37
2	1 35 0	1 38 39	1 42 21	1 46 7	1 49 59	1 53 56	1 57 57	2 2 2	2 6 10	2 10 22	2 14 39	2 19 0	2 23 26	2 27 54	2 32 27
3	1 36 49	1 40 32	1 44 18	1 48 9	1 52 6	1 56 7	2 0 13	2 4 22	2 8 35	2 12 52	2 17 14	2 21 39	2 26 10	2 30 43	2 35 21
4	1 38 43	1 42 30	1 46 21	1 50 17	1 54 19	1 58 25	2 2 36	2 6 50	2 11 8	2 15 30	2 19 57	2 24 27	2 29 2	2 33 41	2 38 25
5	1 40 44	1 44 36	1 48 32	1 52 33	1 56 40	2 0 51	2 5 7	2 9 26	2 13 49	2 18 17	2 22 50	2 27 25	2 32 4	2 36 49	2 41 40
6	1 42 49	1 46 46	1 50 48	1 54 54	1 59 6	2 3 22	2 7 43	2 12 8	2 16 37	2 21 11	2 25 50	2 30 31	2 35 17	2 40 6	2 45 2
7	1 44 59	1 49 1	1 53 9	1 57 20	2 1 37	2 5 59	2 10 26	2 14 57	2 19 32	2 24 12	2 28 57	2 33 44	2 38 37	2 43 32	2 48 33
8	1 47 15	1 51 23	1 55 37	1 59 54	2 4 16	2 8 43	2 13 16	2 17 53	2 22 34	2 27 20	2 32 11	2 37 6	2 42 6	2 47 9	2 52 16
9	1 49 40	1 53 54	1 58 13	2 2 37	2 7 5	2 11 38	2 16 16	2 20 59	2 25 46	2 30 38	2 35 35	2 40 39	2 45 45	2 50 55	2 56 9
10	1 52 15	1 56 35	2 1 0	2 5 30	2 10 5	2 14 45	2 19 29	2 24 18	2 29 12	2 34 11	2 39 15	2 44 23	2 49 36	2 54 53	3 0 15
11	1 54 57	1 59 24	2 3 56	2 8 32	2 13 14	2 18 1	2 22 52	2 27 48	2 32 48	2 37 54	2 43 5	2 48 19	2 53 39	2 59 3	3 4 31
12	1 57 47	2 2 21	2 6 59	2 11 43	2 16 32	2 21 26	2 26 24	2 31 27	2 36 35	2 41 48	2 47 6	2 52 28	2 57 56	3 3 27	3 9 1
13	2 0 46	2 5 28	2 10 14	2 15 4	2 20 1	2 25 2	2 30 7	2 35 17	2 40 33	2 45 54	2 51 20	2 56 51	3 2 26	3 8 5	3 13 47
14	2 3 58	2 8 46	2 13 39	2 18 37	2 23 42	2 28 51	2 34 5	2 39 23	2 44 47	2 50 16	2 55 50	3 1 30	3 7 12	3 13 0	3 18 52
15	2 7 25	2 12 20	2 17 21	2 22 27	2 27 39	2 32 57	2 38 20	2 43 47	2 49 19	2 54 56	3 0 39	3 6 26	3 12 16	3 18 13	3 24 16
16	2 11 4	2 16 9	2 21 18	2 26 33	2 31 54	2 37 19	2 42 52	2 48 29	2 54 10	2 59 57	3 5 49	3 11 45	3 17 48	3 23 54	3 30 5
17	2 14 59	2 20 13	2 25 31	2 30 55	2 36 24	2 42 0	2 47 41	2 53 28	2 59 19	3 5 15	3 11 15	3 17 23	3 23 35	3 29 49	3 36 13
18	2 19 11	2 24 34	2 30 2	2 35 37	2 41 15	2 47 1	2 52 52	2 58 48	3 4 49	3 10 56	3 17 6	3 23 24	3 29 45	3 36 13	3 42 43
19	2 23 40	2 29 13	2 34 52	2 40 36	2 46 26	2 52 22	2 58 24	3 4 31	3 10 42	3 16 59	3 23 21	3 29 48	3 26 19	3 42 55	3 49 38
20	2 28 36	2 34 20	2 40 10	2 46 5	2 52 6	2 58 13	3 4 25	3 10 42	3 17 5	3 23 33	3 30 5	3 36 43	3 43 26	3 50 13	3 57 5
21	2 33 55	2 39 50	2 45 50	2 51 57	2 58 10	3 4 28	3 10 52	3 17 22	3 23 56	3 30 35	3 37 20	3 44 11	3 51 7	3 58 7	4 5 11
22	2 39 41	2 45 48	2 52 1	2 58 20	3 4 45	3 11 15	3 17 49	3 24 31	3 31 22	3 38 16	3 45 13	3 52 15	3 59 23	4 6 35	4 13 51
23	2 46 2	2 52 22	2 58 48	3 5 20	3 11 58	3 18 41	3 25 31	3 32 27	3 39 28	3 46 35	3 53 47	4 1 3	4 8 23	4 15 50	4 23 23

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 31 32	1 35 3	1 38 38	1 42 16	1 45 58	1 49 46	1 53 36	1 57 32	2 1 31	2 5 34	2 9 41	2 13 53	2 18 7	2 22 27	2 26 50
1	1 29 53	1 33 22	1 36 53	1 40 26	1 44 4	1 47 48	1 51 33	1 55 25	1 59 21	2 3 21	2 7 24	2 11 32	2 15 42	2 19 56	2 24 15
2	1 28 18	1 31 44	1 35 11	1 38 40	1 42 14	1 45 54	1 49 35	1 53 23	1 57 15	2 1 11	2 5 11	2 9 14	2 13 20	2 17 30	2 21 44
3	1 26 47	1 30 10	1 33 33	1 36 58	1 40 28	1 44 4	1 47 41	1 51 25	1 55 13	1 59 5	2 3 1	2 7 0	2 11 2	2 15 8	2 19 18
4	1 25 20	1 28 39	1 31 58	1 35 19	1 38 46	1 42 18	1 45 51	1 49 31	1 53 15	1 57 3	2 0 55	2 4 50	2 8 48	2 12 50	2 16 56
5	1 23 56	1 27 11	1 30 26	1 33 44	1 37 7	1 40 35	1 44 5	1 47 41	1 51 21	1 55 5	1 58 53	2 2 44	2 6 38	2 10 36	2 14 38
6	1 22 34	1 25 46	1 28 57	1 32 12	1 35 31	1 38 55	1 42 22	1 45 54	1 49 30	1 53 10	1 56 54	2 0 41	2 4 31	2 8 25	2 12 23
7	1 21 15	1 24 23	1 27 31	1 30 43	1 33 58	1 37 18	1 40 42	1 44 10	1 47 42	1 51 18	1 54 58	1 58 41	2 2 27	2 6 17	2 10 11
8	1 19 58	1 23 2	1 26 7	1 29 16	1 32 28	1 35 44	1 39 5	1 42 29	1 45 57	1 49 29	1 53 5	1 56 44	2 0 26	2 4 12	2 8 2
9	1 18 43	1 21 43	1 24 45	1 27 51	1 31 0	1 34 13	1 37 31	1 40 51	1 44 15	1 47 43	1 51 15	1 54 50	1 58 28	2 2 10	2 5 56
10	1 17 30	1 20 26	1 23 25	1 26 28	1 29 34	1 32 44	1 35 58	1 39 15	1 42 36	1 46 0	1 49 28	1 52 59	1 56 33	2 0 11	2 3 53
11	1 16 17	1 19 10	1 22 7	1 25 7	1 28 10	1 31 17	1 34 28	1 37 42	1 41 0	1 44 19	1 47 44	1 51 11	1 54 41	1 58 15	2 1 53
12	1 15 6	1 17 56	1 20 51	1 23 48	1 26 48	1 29 52	1 33 0	1 36 11	1 39 26	1 42 41	1 46 3	1 49 26	1 52 52	1 56 22	1 59 56
13	1 13 57	1 16 44	1 19 36	1 22 31	1 25 28	1 28 29	1 31 34	1 34 42	1 37 54	1 41 6	1 44 25	1 47 44	1 51 6	1 54 32	1 58 2
14	1 12 50	1 15 34	1 18 23	1 21 16	1 24 10	1 27 8	1 30 10	1 33 15	1 36 24	1 39 33	1 42 49	1 46 5	1 49 23	1 52 45	1 56 11
15	1 11 45	1 14 26	1 17 12	1 20 3	1 22 54	1 25 49	1 28 48	1 31 50	1 34 56	1 38 2	1 41 15	1 44 28	1 47 43	1 51 1	1 54 23
16	1 10 42	1 13 20	1 16 3	1 18 51	1 21 40	1 24 32	1 27 28	1 30 27	1 33 30	1 36 33	1 39 43	1 42 53	1 46 5	1 49 20	1 52 38
17	1 9 40	1 12 16	1 14 56	1 17 41	1 20 28	1 23 17	1 26 10	1 29 6	1 32 6	1 35 6	1 38 12	1 41 20	1 44 30	1 47 42	1 50 56
18	1 8 39	1 11 13	1 13 50	1 16 32	1 19 16	1 22 2	1 24 53	1 27 46	1 30 43	1 33 41	1 36 43	1 39 49	1 42 57	1 46 6	1 49 17
19	1 7 39	1 10 10	1 12 45	1 15 24	1 18 5	1 20 49	1 23 37	1 26 27	1 29 21	1 32 17	1 35 16	1 38 19	1 41 25	1 44 32	1 47 41
20	1 6 39	1 9 8	1 11 41	1 14 17	1 16 55	1 19 37	1 22 22	1 25 10	1 28 1	1 30 55	1 33 51	1 36 51	1 39 54	1 42 59	1 46 7
21	1 5 40	1 8 7	1 10 38	1 13 11	1 15 46	1 18 26	1 21 8	1 23 54	1 26 42	1 29 33	1 32 27	1 35 24	1 38 24	1 41 27	1 44 33
22	1 4 42	1 7 7	1 9 35	1 12 6	1 14 38	1 17 16	1 19 55	1 22 38	1 25 24	1 28 12	1 31 4	1 33 58	1 36 55	1 39 56	1 42 59
23	1 3 45	1 6 8	1 8 33	1 11 2	1 13 31	1 16 6	1 18 43	1 21 23	1 24 6	1 26 52	1 29 41	1 32 33	1 35 27	1 38 25	1 41 26

LATITUDE 41° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 27	0 10 34	0 10 45	0 11 1	0 11 21	0 11 46	0 12 16	0 12 49	0 13 28	0 14 11	0 14 58	0 15 50	0 16 47	0 17 47	0 18 52
1	0 10 28	0 10 36	0 10 47	0 11 3	0 11 23	0 11 49	0 12 20	0 12 54	0 13 33	0 14 17	0 15 5	0 15 58	0 16 56	0 17 57	0 19 3
2	0 10 30	0 10 38	0 10 49	0 11 5	0 11 26	0 11 52	0 12 24	0 12 59	0 13 39	0 14 23	0 15 12	0 16 6	0 17 6	0 18 8	0 19 14
3	0 10 31	0 10 40	0 10 51	0 11 7	0 11 29	0 11 55	0 12 28	0 13 4	0 13 45	0 14 29	0 15 19	0 16 15	0 17 16	0 18 19	0 19 26
4	0 10 33	0 10 42	0 10 53	0 11 9	0 11 32	0 11 58	0 12 32	0 13 9	0 13 51	0 14 36	0 15 27	0 16 24	0 17 26	0 18 31	0 19 39
5	0 10 34	0 10 44	0 10 55	0 11 11	0 11 35	0 12 1	0 12 36	0 13 14	0 13 57	0 14 43	0 15 35	0 16 33	0 17 37	0 18 44	0 19 53
6	0 10 36	0 10 46	0 10 57	0 11 13	0 11 38	0 12 4	0 12 40	0 13 19	0 14 3	0 14 50	0 15 43	0 16 43	0 17 48	0 18 57	0 20 8
7	0 10 37	0 10 48	0 10 59	0 11 15	0 11 41	0 12 8	0 12 44	0 13 24	0 14 9	0 14 57	0 15 52	0 16 53	0 17 59	0 19 10	0 20 24
8	0 10 39	0 10 49	0 11 1	0 11 17	0 11 44	0 12 12	0 12 48	0 13 29	0 14 15	0 15 5	0 16 1	0 17 3	0 18 11	0 19 24	0 20 41
9	0 10 40	0 10 50	0 11 3	0 11 20	0 11 47	0 12 16	0 12 53	0 13 34	0 14 21	0 15 13	0 16 10	0 17 14	0 18 23	0 19 38	0 20 58
10	0 10 42	0 10 51	0 11 5	0 11 23	0 11 50	0 12 20	0 12 58	0 13 40	0 14 27	0 15 21	0 16 20	0 17 25	0 18 36	0 19 53	0 21 16
11	0 10 43	0 10 52	0 11 7	0 11 26	0 11 53	0 12 25	0 13 3	0 13 46	0 14 34	0 15 29	0 16 30	0 17 37	0 18 50	0 20 9	0 21 35
12	0 10 45	0 10 53	0 11 9	0 11 29	0 11 57	0 12 30	0 13 8	0 13 52	0 14 42	0 15 38	0 16 41	0 17 50	0 19 5	0 20 26	0 21 55
13	0 10 46	0 10 54	0 11 11	0 11 32	0 12 1	0 12 35	0 13 14	0 13 59	0 14 50	0 15 48	0 16 53	0 18 4	0 19 21	0 20 44	0 22 16
14	0 10 48	0 10 56	0 11 13	0 11 35	0 12 5	0 12 40	0 13 20	0 14 6	0 14 59	0 15 59	0 17 6	0 18 19	0 19 38	0 21 3	0 22 38
15	0 10 49	0 10 58	0 11 15	0 11 38	0 12 9	0 12 45	0 13 26	0 14 14	0 15 9	0 16 11	0 17 20	0 18 34	0 19 55	0 21 23	0 23 1
16	0 10 51	0 11 0	0 11 17	0 11 41	0 12 13	0 12 50	0 13 33	0 14 22	0 15 19	0 16 23	0 17 34	0 18 51	0 20 14	0 21 45	0 23 25
17	0 10 52	0 11 2	0 11 19	0 11 44	0 12 17	0 12 56	0 13 40	0 14 31	0 15 30	0 16 36	0 17 49	0 19 9	0 20 35	0 22 8	0 23 51
18	0 10 54	0 11 4	0 11 21	0 11 47	0 12 21	0 13 2	0 13 47	0 14 40	0 15 41	0 16 50	0 18 5	0 19 28	0 20 57	0 22 33	0 24 19
19	0 10 55	0 11 6	0 11 24	0 11 51	0 12 25	0 13 8	0 13 55	0 14 50	0 15 53	0 17 5	0 18 22	0 19 48	0 21 20	0 23 9	0 24 49
20	0 10 57	0 11 8	0 11 27	0 11 55	0 12 29	0 13 14	0 14 3	0 15 1	0 16 6	0 17 21	0 18 41	0 20 10	0 21 45	0 23 29	0 25 22
21	0 10 58	0 11 10	0 11 29	0 11 59	0 12 34	0 13 20	0 14 12	0 15 12	0 16 20	0 17 38	0 19 2	0 20 34	0 22 12	0 24 1	0 25 58
22	0 11 0	0 11 12	0 11 32	0 12 3	0 12 40	0 13 27	0 14 22	0 15 24	0 16 35	0 17 56	0 19 29	0 21 0	0 22 43	0 24 36	0 26 38
23	0 11 2	0 11 14	0 11 35	0 12 7	0 12 46	0 13 34	0 14 32	0 15 37	0 16 51	0 18 16	0 19 48	0 21 28	0 23 17	0 25 15	0 27 23

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 27	0 10 34	0 10 45	0 11 1	0 11 21	0 11 46	0 12 16	0 12 49	0 13 28	0 14 11	0 14 58	0 15 50	0 16 47	0 17 47	0 18 52
1	0 10 25	0 10 32	0 10 43	0 10 59	0 11 18	0 11 43	0 12 12	0 12 45	0 13 23	0 14 4	0 14 51	0 15 42	0 16 38	0 17 37	0 18 41
2	0 10 23	0 10 30	0 10 41	0 10 56	0 11 15	0 11 40	0 12 8	0 12 41	0 13 18	0 13 57	0 14 44	0 15 34	0 16 29	0 17 27	0 18 30
3	0 10 21	0 10 28	0 10 39	0 10 53	0 11 12	0 11 37	0 12 4	0 12 37	0 13 13	0 13 51	0 14 37	0 15 26	0 16 20	0 17 17	0 18 19
4	0 10 19	0 10 26	0 10 36	0 10 50	0 11 9	0 11 33	0 12 0	0 12 32	0 13 8	0 13 45	0 14 30	0 15 18	0 16 11	0 17 7	0 18 8
5	0 10 17	0 10 24	0 10 33	0 10 47	0 11 6	0 11 29	0 11 56	0 12 27	0 13 3	0 13 39	0 14 23	0 15 10	0 16 2	0 16 57	0 17 57
6	0 10 15	0 10 21	0 10 30	0 10 44	0 11 3	0 11 25	0 11 52	0 12 22	0 12 58	0 13 33	0 14 16	0 15 2	0 15 53	0 16 48	0 17 46
7	0 10 12	0 10 18	0 10 27	0 10 41	0 11 0	0 11 21	0 11 48	0 12 17	0 12 52	0 13 27	0 14 9	0 14 54	0 15 44	0 16 38	0 17 35
8	0 10 9	0 10 15	0 10 24	0 10 38	0 10 56	0 11 17	0 11 44	0 12 12	0 12 46	0 13 21	0 14 2	0 14 47	0 15 36	0 16 29	0 17 24
9	0 10 6	0 10 12	0 10 21	0 10 35	0 10 52	0 11 13	0 11 39	0 12 7	0 12 40	0 13 15	0 13 55	0 14 39	0 15 27	0 16 19	0 17 14
10	0 10 3	0 10 9	0 10 18	0 10 32	0 10 48	0 11 9	0 11 34	0 12 2	0 12 34	0 13 9	0 13 49	0 14 32	0 15 19	0 16 10	0 17 4
11	0 10 0	0 10 6	0 10 15	0 10 29	0 10 44	0 11 5	0 11 30	0 11 57	0 12 29	0 13 2	0 13 42	0 14 24	0 15 10	0 16 0	0 16 54
12	0 9 57	0 10 3	0 10 12	0 10 25	0 10 40	0 11 1	0 11 26	0 11 52	0 12 24	0 12 55	0 13 35	0 14 17	0 15 2	0 15 51	0 16 44
13	0 9 54	0 10 0	0 10 9	0 10 21	0 10 36	0 10 57	0 11 21	0 11 47	0 12 18	0 12 49	0 13 28	0 14 9	0 14 53	0 15 42	0 16 34
14	0 9 51	0 9 57	0 10 6	0 10 17	0 10 32	0 10 53	0 11 16	0 11 42	0 12 12	0 12 43	0 13 21	0 14 2	0 14 45	0 15 33	0 16 24
15	0 9 48	0 9 54	0 10 3	0 10 13	0 10 28	0 10 49	0 11 11	0 11 37	0 12 6	0 12 37	0 13 14	0 13 54	0 14 37	0 15 24	0 16 14
16	0 9 45	0 9 50	0 9 59	0 10 9	0 10 24	0 10 45	0 11 6	0 11 32	0 12 0	0 12 31	0 13 7	0 13 47	0 14 29	0 15 15	0 16 4
17	0 9 41	0 9 46	0 9 55	0 10 5	0 10 20	0 10 40	0 11 1	0 11 27	0 11 54	0 12 25	0 13 0	0 13 39	0 14 21	0 15 6	0 15 54
18	0 9 37	0 9 42	0 9 51	0 10 1	0 10 16	0 10 35	0 10 56	0 11 21	0 11 48	0 12 19	0 12 53	0 13 32	0 14 13	0 14 57	0 15 44
19	0 9 33	0 9 38	0 9 47	0 9 57	0 10 12	0 10 30	0 10 51	0 11 15	0 11 42	0 12 13	0 12 46	0 13 24	0 14 5	0 14 48	0 15 35
20	0 9 29	0 9 34	0 9 43	0 9 53	0 10 7	0 10 25	0 10 46	0 11 9	0 11 36	0 12 7	0 12 40	0 13 17	0 13 57	0 14 39	0 15 26
21	0 9 25	0 9 30	0 9 39	0 9 49	0 10 3	0 10 20	0 10 41	0 11 4	0 11 30	0 12 1	0 12 33	0 13 9	0 13 49	0 14 30	0 15 17
22	0 9 21	0 9 27	0 9 35	0 9 45	0 9 59	0 10 16	0 10 36	0 10 59	0 11 25	0 11 55	0 12 27	0 13 2	0 13 41	0 14 22	0 15 8
23	0 9 19	0 9 24	0 9 31	0 9 42	0 9 55	0 10 12	0 10 32	0 10 54	0 11 20	0 11 49	0 12 21	0 12 55	0 13 33	0 14 14	0 14 58

LATITUDE 41° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 20 2	0 21 16	0 22 35	0 23 58	0 25 25	0 26 57	0 28 34	0 30 15	0 32 0	0 33 50	0 35 44	0 37 42	0 39 45	0 41 52	0 44 3
1	0 20 14	0 21 30	0 22 51	0 24 16	0 25 45	0 27 19	0 28 58	0 30 40	0 32 27	0 34 19	0 36 15	0 38 15	0 40 20	0 42 28	0 44 47
2	0 20 27	0 21 45	0 23 8	0 24 35	0 26 5	0 27 41	0 29 22	0 31 6	0 32 55	0 34 49	0 36 47	0 38 49	0 40 56	0 43 6	0 45 32
3	0 20 41	0 22 1	0 23 25	0 24 54	0 26 26	0 28 4	0 29 47	0 31 33	0 33 24	0 35 20	0 37 21	0 39 25	0 41 34	0 43 47	0 46 18
4	0 20 56	0 22 17	0 23 43	0 25 14	0 26 48	0 28 27	0 30 12	0 32 0	0 33 54	0 35 53	0 37 57	0 40 3	0 42 15	0 44 30	0 47 5
5	0 21 12	0 22 34	0 24 2	0 25 35	0 27 11	0 28 51	0 30 38	0 32 29	0 34 26	0 36 28	0 38 35	0 40 44	0 42 58	0 45 17	0 47 53
6	0 21 28	0 22 52	0 24 22	0 25 57	0 27 35	0 29 17	0 31 6	0 33 0	0 35 0	0 37 5	0 39 15	0 41 27	0 43 44	0 46 7	0 48 43
7	0 21 45	0 23 11	0 24 43	0 26 20	0 28 0	0 29 45	0 31 36	0 33 33	0 35 36	0 37 44	0 39 57	0 42 12	0 44 33	0 47 0	0 49 36
8	0 22 3	0 23 31	0 25 5	0 26 44	0 28 27	0 30 15	0 32 8	0 34 8	0 36 14	0 38 25	0 40 41	0 43 0	0 45 25	0 47 56	0 50 33
9	0 22 22	0 23 52	0 25 28	0 27 10	0 28 56	0 30 47	0 32 43	0 34 46	0 36 55	0 39 9	0 41 28	0 43 51	0 46 20	0 48 55	0 51 34
10	0 22 42	0 24 15	0 25 53	0 27 37	0 29 27	0 31 21	0 33 21	0 35 27	0 37 39	0 39 56	0 42 18	0 44 45	0 47 18	0 49 56	0 52 40
11	0 23 4	0 24 40	0 26 20	0 28 7	0 29 59	0 31 57	0 34 1	0 36 10	0 38 26	0 40 47	0 43 11	0 45 42	0 48 19	0 51 1	0 53 49
12	0 23 27	0 25 6	0 26 48	0 28 38	0 30 33	0 32 35	0 34 43	0 36 55	0 39 15	0 41 41	0 44 7	0 46 42	0 49 23	0 52 9	0 55 1
13	0 23 51	0 25 33	0 27 17	0 29 11	0 31 9	0 33 15	0 35 27	0 37 42	0 40 6	0 42 37	0 45 6	0 47 45	0 50 30	0 53 21	0 56 17
14	0 24 16	0 26 1	0 27 47	0 29 45	0 31 47	0 33 57	0 36 13	0 38 32	0 40 59	0 43 35	0 46 8	0 48 52	0 51 41	0 54 37	0 57 36
15	0 24 42	0 26 30	0 28 19	0 30 21	0 32 27	0 34 41	0 37 1	0 39 24	0 41 55	0 44 36	0 47 13	0 50 2	0 52 56	0 55 57	0 59 0
16	0 25 9	0 27 0	0 28 53	0 30 59	0 33 9	0 35 27	0 37 51	0 40 19	0 42 55	0 45 40	0 48 21	0 51 16	0 54 16	0 57 22	1 0 29
17	0 25 38	0 27 32	0 29 30	0 31 40	0 33 54	0 36 16	0 38 44	0 41 17	0 43 58	0 46 47	0 49 34	0 52 35	0 55 41	0 58 53	1 2 6
18	0 26 10	0 28 7	0 30 10	0 32 24	0 34 42	0 37 9	0 39 41	0 42 19	0 45 5	0 47 59	0 50 53	0 54 0	0 57 12	1 0 31	1 3 52
19	0 26 44	0 28 45	0 30 53	0 33 11	0 35 34	0 38 6	0 40 43	0 43 26	0 46 18	0 49 18	0 52 19	0 55 32	0 58 51	1 2 17	1 5 47
20	0 27 21	0 29 27	0 31 40	0 34 2	0 36 31	0 39 8	0 41 50	0 44 39	0 47 38	0 50 44	0 53 54	0 57 13	1 0 39	1 4 12	1 7 52
21	0 28 1	0 30 13	0 32 31	0 34 58	0 37 33	0 40 16	0 43 5	0 46 0	0 49 6	0 52 19	0 55 37	0 59 4	1 2 37	1 6 18	1 10 6
22	0 28 46	0 31 3	0 33 27	0 36 0	0 38 42	0 41 31	0 44 27	0 47 30	0 50 43	0 54 4	0 57 30	1 1 5	1 4 46	1 8 36	1 12 33
23	0 29 36	0 31 59	0 34 30	0 37 9	0 39 58	0 42 54	0 45 58	0 49 11	0 52 30	0 55 59	0 59 34	1 3 18	1 7 9	1 11 8	1 15 14

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 20 2	0 21 16	0 22 35	0 23 58	0 25 25	0 26 57	0 28 34	0 30 15	0 32 0	0 33 50	0 35 44	0 37 42	0 39 45	0 41 52	0 44 3
1	0 19 50	0 21 2	0 22 20	0 23 42	0 25 6	0 26 36	0 28 11	0 29 50	0 31 34	0 33 22	0 35 14	0 37 10	0 39 10	0 41 15	0 43 24
2	0 19 38	0 20 48	0 22 5	0 23 26	0 24 47	0 26 15	0 27 48	0 29 26	0 31 8	0 32 54	0 34 44	0 36 38	0 38 36	0 40 39	0 42 45
3	0 19 26	0 20 35	0 21 50	0 23 10	0 24 29	0 25 55	0 27 26	0 29 2	0 30 42	0 32 27	0 34 15	0 36 7	0 38 3	0 40 3	0 42 7
4	0 19 14	0 20 23	0 21 35	0 22 54	0 24 11	0 25 35	0 27 4	0 28 39	0 30 17	0 32 0	0 33 46	0 35 36	0 37 30	0 39 28	0 41 30
5	0 19 2	0 20 9	0 21 20	0 22 38	0 23 54	0 25 16	0 26 43	0 28 16	0 29 52	0 31 33	0 33 18	0 35 6	0 36 58	0 38 54	0 40 54
6	0 18 50	0 19 56	0 21 6	0 22 22	0 23 37	0 24 58	0 26 23	0 27 54	0 29 28	0 31 7	0 32 50	0 34 36	0 36 26	0 38 30	0 40 18
7	0 18 38	0 19 43	0 20 51	0 22 6	0 23 21	0 24 41	0 26 4	0 27 33	0 29 5	0 30 42	0 32 23	0 34 7	0 35 55	0 37 57	0 39 43
8	0 18 26	0 19 30	0 20 37	0 21 50	0 23 5	0 24 24	0 25 46	0 27 13	0 28 43	0 30 18	0 31 57	0 33 39	0 35 25	0 37 25	0 39 9
9	0 18 14	0 19 17	0 20 23	0 21 35	0 22 49	0 24 7	0 25 28	0 26 54	0 28 22	0 29 55	0 31 32	0 33 12	0 34 56	0 36 54	0 38 36
10	0 18 2	0 19 4	0 20 10	0 21 20	0 22 33	0 23 50	0 25 10	0 26 35	0 28 2	0 29 33	0 31 8	0 32 46	0 34 28	0 36 14	0 38 4
11	0 17 51	0 18 52	0 19 57	0 21 6	0 22 18	0 23 33	0 24 52	0 26 16	0 27 42	0 29 11	0 30 45	0 32 21	0 34 1	0 35 45	0 37 33
12	0 17 40	0 18 40	0 19 44	0 20 52	0 22 3	0 23 17	0 24 34	0 25 57	0 27 22	0 28 50	0 30 22	0 31 56	0 33 34	0 35 16	0 37 2
13	0 17 29	0 18 28	0 19 31	0 20 38	0 21 48	0 23 1	0 24 17	0 25 38	0 27 2	0 28 29	0 29 59	0 31 32	0 33 8	0 34 48	0 36 32
14	0 17 18	0 18 16	0 19 18	0 20 24	0 21 33	0 22 45	0 24 0	0 25 19	0 26 42	0 28 8	0 29 36	0 31 8	0 32 42	0 34 21	0 36 3
15	0 17 7	0 18 4	0 19 5	0 20 10	0 21 18	0 22 29	0 23 43	0 25 0	0 26 22	0 27 47	0 29 13	0 30 44	0 32 17	0 33 55	0 35 35
16	0 16 56	0 17 52	0 18 52	0 19 56	0 21 3	0 22 13	0 23 26	0 24 41	0 26 2	0 27 26	0 28 51	0 30 20	0 31 52	0 33 29	0 35 7
17	0 16 45	0 17 40	0 18 39	0 19 42	0 20 48	0 21 57	0 23 9	0 24 23	0 25 42	0 27 5	0 28 29	0 29 56	0 31 27	0 33 3	0 34 39
18	0 16 35	0 17 29	0 18 27	0 19 28	0 20 33	0 21 41	0 22 52	0 24 5	0 25 22	0 26 44	0 28 7	0 29 33	0 31 2	0 32 37	0 34 12
19	0 16 25	0 17 18	0 18 15	0 19 15	0 20 18	0 21 25	0 22 35	0 23 47	0 25 3	0 26 23	0 27 45	0 29 10	0 30 38	0 32 11	0 33 45
20	0 16 15	0 17 7	0 18 3	0 19 2	0 20 4	0 21 9	0 22 18	0 23 29	0 24 44	0 26 2	0 27 23	0 28 47	0 30 14	0 31 45	0 33 18
21	0 16 5	0 16 56	0 17 51	0 18 49	0 19 50	0 20 54	0 22 2	0 23 12	0 24 35	0 25 42	0 27 2	0 28 24	0 29 50	0 31 19	0 32 51
22	0 15 55	0 16 45	0 17 39	0 18 36	0 19 36	0 20 39	0 21 46	0 22 55	0 24 7	0 25 22	0 26 41	0 28 2	0 29 26	0 30 54	0 32 24
23	0 15 45	0 16 35	0 17 28	0 18 24	0 19 23	0 20 25	0 21 30	0 22 38	0 23 49	0 25 3	0 26 20	0 27 40	0 29 3	0 30 29	0 31 58

LATITUDE 41° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 46 19	0 48 39	0 51 4	0 53 33	0 56 5	0 58 42	1 1 24	1 4 10	1 7 0	1 9 54	1 12 53	1 15 55	1 19 2	1 22 13	1 25 28
1	0 47 6	0 49 29	0 51 57	0 54 27	0 57 2	0 59 42	1 2 27	1 5 16	1 8 9	1 11 7	1 14 9	1 17 15	1 20 25	1 23 40	1 26 59
2	0 47 54	0 50 20	0 52 51	0 55 23	0 58 1	1 0 44	1 3 33	1 6 25	1 9 21	1 12 22	1 15 27	1 18 37	1 21 51	1 25 10	1 28 33
3	0 48 43	0 51 12	0 53 46	0 56 21	0 59 3	1 1 49	1 4 41	1 7 36	1 10 36	1 13 40	1 16 49	1 20 3	1 23 21	1 26 44	1 30 11
4	0 49 33	0 52 5	0 54 42	0 57 21	1 0 7	1 2 57	1 5 52	1 8 51	1 11 54	1 15 2	1 18 15	1 21 33	1 24 55	1 28 22	1 31 53
5	0 50 24	0 52 59	0 55 39	0 58 23	1 1 13	1 4 7	1 7 6	1 10 9	1 13 16	1 16 28	1 19 45	1 23 7	1 26 33	1 30 4	1 33 39
6	0 51 17	0 53 55	0 56 39	0 59 28	1 2 22	1 5 20	1 8 23	1 11 30	1 14 41	1 17 58	1 21 19	1 24 45	1 28 15	1 31 50	1 35 30
7	0 52 13	0 54 55	0 57 43	1 0 37	1 3 34	1 6 36	1 9 43	1 12 54	1 16 10	1 19 32	1 22 58	1 26 28	1 30 3	1 33 41	1 37 26
8	0 53 13	0 55 59	0 58 51	1 1 49	1 4 50	1 7 56	1 11 7	1 14 22	1 17 43	1 21 10	1 24 41	1 28 16	1 31 56	1 35 38	1 39 28
9	0 54 18	0 57 8	1 0 4	1 3 5	1 6 10	1 9 20	1 12 36	1 15 56	1 19 21	1 22 53	1 26 29	1 30 9	1 33 54	1 37 42	1 41 37
10	0 55 28	0 58 22	1 1 22	1 4 27	1 7 36	1 10 50	1 14 10	1 17 35	1 21 6	1 24 42	1 28 23	1 32 8	1 35 58	1 39 53	1 43 53
11	0 56 42	0 59 40	1 2 44	1 5 54	1 9 7	1 12 25	1 15 50	1 19 20	1 22 56	1 26 37	1 30 23	1 34 14	1 38 9	1 42 11	1 46 17
12	0 57 59	1 1 2	1 4 10	1 7 25	1 10 42	1 14 5	1 17 35	1 21 11	1 24 52	1 28 38	1 32 30	1 36 27	1 40 28	1 44 36	1 48 48
13	0 59 20	1 2 28	1 5 40	1 9 0	1 12 22	1 15 51	1 19 27	1 23 9	1 26 55	1 30 46	1 34 44	1 38 48	1 42 55	1 47 8	1 51 27
14	1 0 44	1 3 58	1 7 15	1 10 41	1 14 9	1 17 44	1 21 26	1 25 14	1 29 6	1 33 3	1 37 7	1 41 17	1 45 32	1 49 50	1 54 16
15	1 2 13	1 5 32	1 8 56	1 12 26	1 16 2	1 19 44	1 23 32	1 27 26	1 31 25	1 35 29	1 39 39	1 43 56	1 48 18	1 52 44	1 57 16
16	1 3 48	1 7 12	1 10 43	1 14 20	1 18 2	1 21 52	1 25 46	1 29 47	1 33 53	1 38 5	1 42 22	1 46 46	1 51 16	1 55 50	2 0 30
17	1 5 30	1 9 0	1 12 38	1 16 22	1 20 11	1 24 8	1 28 10	1 32 18	1 36 32	1 40 52	1 45 17	1 49 48	1 54 26	1 59 8	2 3 56
18	1 7 21	1 10 58	1 14 43	1 18 34	1 22 31	1 26 35	1 30 45	1 35 1	1 39 23	1 43 51	1 48 24	1 53 3	1 57 49	2 2 39	2 7 35
19	1 9 23	1 13 7	1 16 59	1 20 58	1 25 3	1 29 15	1 33 33	1 37 57	1 42 27	1 47 3	1 51 45	1 56 32	2 1 26	2 6 25	2 11 30
20	1 11 38	1 15 29	1 19 28	1 23 35	1 27 49	1 32 9	1 36 35	1 41 7	1 45 45	1 50 30	1 55 21	2 0 17	2 5 19	2 10 28	2 15 43
21	1 14 6	1 18 5	1 22 10	1 26 26	1 30 49	1 35 18	1 39 53	1 44 33	1 49 19	1 54 15	1 59 15	2 4 21	2 9 33	2 14 53	2 20 18
22	1 16 42	1 20 50	1 25 5	1 29 31	1 34 4	1 38 42	1 43 27	1 48 17	1 53 12	1 58 19	2 3 31	2 8 48	2 14 11	2 19 42	2 25 17
23	1 19 26	1 23 45	1 28 13	1 32 50	1 37 33	1 42 22	1 47 17	1 52 19	1 57 29	2 2 48	2 8 11	2 13 39	2 19 14	2 24 55	2 30 42

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 46 19	0 48 39	0 51 4	0 53 33	0 56 5	0 58 43	1 1 24	1 4 10	1 7 0	1 9 54	1 12 53	1 15 55	1 19 2	1 22 13	1 25 28
1	0 45 36	0 47 54	0 50 15	0 52 41	0 55 10	0 57 45	1 0 23	1 3 6	1 5 52	1 8 43	1 11 39	1 14 39	1 17 43	1 20 50	1 24 1
2	0 44 55	0 47 10	0 49 28	0 51 51	0 54 17	0 56 49	0 59 24	1 2 4	1 4 47	1 7 35	1 10 28	1 13 25	1 16 26	1 19 30	1 22 37
3	0 44 15	0 46 27	0 48 42	0 51 3	0 53 26	0 55 55	0 58 27	1 1 4	1 3 44	1 6 29	1 9 19	1 12 13	1 15 11	1 18 12	1 21 16
4	0 43 36	0 45 45	0 47 58	0 50 16	0 52 37	0 55 2	0 57 32	1 0 6	1 2 43	1 5 25	1 8 12	1 11 3	1 13 58	1 16 56	1 19 57
5	0 42 57	0 45 4	0 47 15	0 49 30	0 51 49	0 54 11	0 56 39	0 59 10	1 1 44	1 4 23	1 7 7	1 9 55	1 12 47	1 15 42	1 18 40
6	0 42 19	0 44 24	0 46 33	0 48 46	0 51 2	0 53 21	0 55 47	0 58 16	1 0 47	1 3 23	1 6 4	1 8 49	1 11 38	1 14 30	1 17 25
7	0 41 42	0 43 45	0 45 52	0 48 3	0 50 16	0 52 33	0 54 57	0 57 23	0 59 52	1 2 25	1 5 3	1 7 45	1 10 31	1 13 20	1 16 12
8	0 41 6	0 43 7	0 45 12	0 47 21	0 49 32	0 51 47	0 54 8	0 56 32	0 58 59	1 1 29	1 4 4	1 6 43	1 9 26	1 12 12	1 15 1
9	0 40 31	0 42 30	0 44 33	0 46 40	0 48 49	0 51 2	0 53 20	0 55 42	0 58 7	1 0 34	1 3 7	1 5 43	1 8 23	1 11 6	1 13 52
10	0 39 57	0 41 54	0 43 55	0 46 0	0 48 7	0 50 18	0 52 33	0 54 53	0 57 16	0 59 41	1 2 11	1 4 45	1 7 22	1 10 1	1 12 44
11	0 39 24	0 41 19	0 43 18	0 45 21	0 47 26	0 49 35	0 51 47	0 54 5	0 56 26	0 58 49	1 1 16	1 3 47	1 6 21	1 8 58	1 11 38
12	0 38 52	0 40 45	0 42 42	0 44 43	0 46 46	0 48 53	0 51 2	0 53 18	0 55 37	0 57 58	1 0 22	1 2 50	1 5 21	1 7 56	1 10 33
13	0 38 21	0 40 12	0 42 7	0 44 6	0 46 7	0 48 12	0 50 18	0 52 32	0 54 49	0 57 8	0 59 30	1 1 55	1 4 23	1 6 55	1 9 30
14	0 37 50	0 39 40	0 41 33	0 43 30	0 45 29	0 47 32	0 49 35	0 51 47	0 54 2	0 56 19	0 58 39	1 1 1	1 3 27	1 5 56	1 8 29
15	0 37 20	0 39 8	0 40 59	0 42 54	0 44 52	0 46 52	0 48 53	0 51 5	0 53 15	0 55 30	0 57 48	1 0 8	1 2 32	1 4 59	1 7 30
16	0 36 51	0 38 37	0 40 26	0 42 19	0 44 15	0 46 13	0 48 12	0 50 20	0 52 29	0 54 42	0 56 58	0 59 16	1 1 38	1 4 3	1 6 32
17	0 36 22	0 38 6	0 39 53	0 41 44	0 43 38	0 45 35	0 47 32	0 49 37	0 51 44	0 53 55	0 56 9	0 58 25	1 0 45	1 3 8	1 5 35
18	0 35 53	0 37 35	0 39 20	0 41 10	0 43 2	0 44 57	0 46 53	0 48 55	0 51 0	0 53 9	0 55 21	0 57 35	0 59 53	1 2 14	1 4 39
19	0 35 24	0 37 4	0 38 48	0 40 36	0 42 26	0 44 19	0 46 15	0 48 14	0 50 17	0 52 24	0 54 34	0 56 46	0 59 2	1 1 21	1 3 44
20	0 34 55	0 36 34	0 38 16	0 40 2	0 41 50	0 43 42	0 45 37	0 47 34	0 49 35	0 51 40	0 53 48	0 55 58	0 58 12	1 0 29	1 2 49
21	0 34 26	0 36 4	0 37 45	0 39 29	0 41 15	0 43 6	0 44 59	0 46 55	0 48 54	0 50 57	0 53 3	0 55 11	0 57 23	0 59 38	1 1 56
22	0 33 58	0 35 34	0 37 14	0 38 56	0 40 41	0 42 30	0 44 22	0 46 16	0 48 14	0 50 15	0 52 19	0 54 25	0 56 35	0 58 48	1 1 3
23	0 33 30	0 35 5	0 36 43	0 38 24	0 40 8	0 41 55	0 43 45	0 45 38	0 47 34	0 49 34	0 51 36	0 53 39	0 55 47	0 57 58	1 0 11

LATITUDE 41° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 28 47	1 32 10	1 35 38	1 39 9	1 42 44	1 46 24	1 50 7	1 53 55	1 57 46	2 1 42	2 5 41	2 9 44	2 13 51	2 18 2	2 22 17
1	1 30 22	1 33 48	1 37 20	1 40 55	1 44 34	1 48 17	1 52 4	1 55 57	1 59 52	2 3 52	2 7 55	2 12 2	2 16 14	2 20 29	2 24 49
2	1 32 0	1 35 30	1 39 6	1 42 45	1 46 28	1 50 15	1 54 7	1 58 4	2 2 3	2 6 8	2 10 16	2 14 27	2 18 43	2 23 3	2 27 28
3	1 33 42	1 37 16	1 40 57	1 44 40	1 48 27	1 52 18	1 56 15	2 0 16	2 4 20	2 8 30	2 12 43	2 16 59	2 21 19	2 25 44	2 30 14
4	1 35 28	1 39 7	1 42 52	1 46 40	1 50 31	1 54 27	1 58 29	2 2 34	2 6 42	2 10 58	2 15 16	2 19 37	2 24 2	2 28 32	2 33 7
5	1 37 19	1 41 3	1 44 52	1 48 45	1 52 41	1 56 42	2 0 49	2 4 59	2 9 13	2 13 32	2 17 55	2 22 22	2 26 53	2 31 28	2 36 8
6	1 39 15	1 43 4	1 46 58	1 50 56	1 54 57	1 59 3	2 3 15	2 7 30	2 11 49	2 16 13	2 20 41	2 25 13	2 29 50	2 34 31	2 39 17
7	1 41 16	1 45 10	1 49 9	1 53 12	1 57 19	2 1 30	2 5 47	2 10 7	2 14 31	2 19 1	2 23 35	2 28 12	2 32 55	2 37 42	2 42 34
8	1 43 23	1 47 22	1 51 26	1 55 34	1 59 47	2 4 4	2 8 26	2 12 51	2 17 21	2 21 57	2 26 37	2 31 20	2 36 9	2 41 2	2 46 0
9	1 45 37	1 49 41	1 53 50	1 58 3	2 2 22	2 6 45	2 11 13	2 15 44	2 20 20	2 25 2	2 29 48	2 34 37	2 39 32	2 44 31	2 49 35
10	1 47 58	1 52 7	1 56 21	2 0 40	2 5 5	2 9 34	2 14 8	2 18 46	2 23 28	2 28 15	2 33 7	2 38 4	2 43 5	2 48 10	2 53 20
11	1 50 26	1 54 41	1 59 0	2 3 25	2 7 56	2 12 32	2 17 12	2 21 57	2 26 46	2 31 40	2 36 38	2 41 41	2 46 49	2 52 1	2 57 17
12	1 53 2	1 57 23	2 1 49	2 6 20	2 10 57	2 15 39	2 20 26	2 25 18	2 30 15	2 35 16	2 40 21	2 45 30	2 50 45	2 56 4	3 1 27
13	1 55 48	2 0 15	2 4 48	2 9 26	2 14 9	2 18 58	2 23 52	2 28 51	2 33 55	2 39 3	2 44 16	2 49 33	2 54 55	3 0 22	3 5 52
14	1 58 45	2 3 19	2 7 59	2 12 44	2 17 34	2 22 30	2 27 31	2 32 37	2 37 48	2 43 4	2 48 25	2 53 50	2 59 20	3 4 55	3 10 33
15	2 1 53	2 6 35	2 11 23	2 16 16	2 21 14	2 26 17	2 31 26	2 36 40	2 41 58	2 47 21	2 52 49	2 58 22	3 4 0	3 9 43	3 15 31
16	2 5 15	2 10 5	2 15 1	2 20 2	2 25 8	2 30 19	2 35 36	2 40 59	2 46 25	2 51 57	2 57 32	3 3 13	3 8 58	3 14 50	3 20 47
17	2 8 50	2 13 48	2 18 53	2 24 2	2 29 17	2 34 36	2 40 2	2 45 34	2 51 9	2 56 50	3 2 34	3 8 24	3 14 16	3 20 17	3 26 23
18	2 12 38	2 17 45	2 22 59	2 28 17	2 33 41	2 39 9	2 44 44	2 50 25	2 56 10	3 2 0	3 7 54	3 13 54	3 19 55	3 26 5	3 32 21
19	2 16 42	2 21 58	2 27 21	2 32 49	2 38 22	2 44 0	2 49 44	2 55 34	3 1 29	3 7 29	3 13 33	3 19 43	3 25 56	3 32 16	3 38 41
20	2 21 4	2 26 30	2 32 3	2 37 41	2 43 23	2 49 11	2 55 4	3 1 3	3 7 8	3 13 18	3 19 34	3 25 54	3 32 19	3 38 49	3 45 24
21	2 25 50	2 31 27	2 37 11	2 43 0	2 48 54	2 54 53	3 0 58	3 7 8	3 13 23	3 19 44	3 26 9	3 32 38	3 39 12	3 45 51	3 52 35
22	2 31 0	2 36 48	2 42 43	2 48 44	2 54 50	3 1 1	3 7 18	3 13 40	3 20 7	3 26 40	3 33 15	3 39 55	3 46 41	3 53 32	4 0 28
23	2 36 36	2 42 36	2 48 43	2 54 56	3 1 14	3 7 37	3 14 6	3 20 40	3 27 20	3 34 5	3 40 54	3 47 49	3 54 49	4 1 54	4 9 4

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 28 47	1 32 10	1 35 38	1 39 9	1 42 44	1 46 24	1 50 7	1 53 55	1 57 46	2 1 42	2 5 41	2 9 44	2 13 51	2 18 2	2 22 17
1	1 27 17	1 30 47	1 34 0	1 37 28	1 40 59	1 44 35	1 48 15	1 51 59	1 55 46	1 59 38	2 3 34	2 7 33	2 11 35	2 15 42	2 19 53
2	1 25 51	1 29 17	1 32 26	1 35 51	1 39 18	1 42 50	1 46 26	1 50 6	1 53 49	1 57 37	2 1 29	2 5 25	2 9 23	2 13 26	2 17 33
3	1 24 28	1 27 50	1 30 55	1 34 17	1 37 40	1 41 8	1 44 40	1 48 16	1 51 55	1 55 39	1 59 27	2 3 19	2 7 13	2 11 12	2 15 15
4	1 23 6	1 26 25	1 29 27	1 32 46	1 36 5	1 39 29	1 42 57	1 46 29	1 50 4	1 53 44	1 57 28	2 1 16	2 5 6	2 9 1	2 13 0
5	1 21 46	1 25 2	1 28 1	1 31 17	1 34 33	1 37 53	1 41 17	1 44 45	1 48 16	1 51 52	1 55 32	1 59 16	2 3 2	2 6 54	2 10 49
6	1 20 28	1 23 41	1 26 37	1 29 50	1 33 3	1 36 20	1 39 40	1 43 4	1 46 31	1 50 3	1 53 39	1 57 19	2 1 1	2 4 49	2 8 40
7	1 19 12	1 22 22	1 25 15	1 28 24	1 31 34	1 34 48	1 38 5	1 41 25	1 44 49	1 48 17	1 51 49	1 55 25	1 59 3	2 2 47	2 6 35
8	1 17 57	1 21 4	1 23 54	1 26 59	1 30 6	1 33 17	1 36 31	1 39 48	1 43 9	1 46 34	1 50 2	1 53 34	1 57 9	2 0 49	2 4 33
9	1 16 44	1 19 48	1 22 35	1 25 36	1 28 40	1 31 48	1 34 59	1 38 13	1 41 31	1 44 53	1 48 18	1 51 46	1 55 18	1 58 54	2 2 34
10	1 15 32	1 18 23	1 21 17	1 24 15	1 27 16	1 30 21	1 33 29	1 36 40	1 39 55	1 43 14	1 46 36	1 50 1	1 53 30	1 57 2	2 0 38
11	1 14 22	1 17 10	1 20 1	1 22 56	1 25 54	1 28 56	1 32 1	1 35 9	1 38 21	1 41 37	1 44 57	1 48 19	1 51 45	1 55 13	1 58 45
12	1 13 14	1 15 59	1 18 47	1 21 39	1 24 34	1 27 33	1 30 35	1 33 40	1 36 50	1 40 3	1 43 20	1 46 40	1 50 2	1 53 27	1 56 56
13	1 12 8	1 14 50	1 17 35	1 20 24	1 23 16	1 26 13	1 29 12	1 32 14	1 35 21	1 38 32	1 41 46	1 45 3	1 48 22	1 51 44	1 55 10
14	1 11 4	1 13 43	1 16 25	1 19 11	1 22 0	1 24 55	1 27 51	1 30 50	1 33 55	1 37 3	1 40 14	1 43 28	1 46 44	1 50 3	1 53 26
15	1 10 2	1 12 38	1 15 17	1 18 0	1 20 47	1 23 39	1 26 32	1 29 28	1 32 31	1 35 36	1 38 44	1 41 55	1 45 8	1 48 24	1 51 44
16	1 9 1	1 11 35	1 14 11	1 16 51	1 19 36	1 22 25	1 25 15	1 28 9	1 31 9	1 34 11	1 37 16	1 40 24	1 43 34	1 46 47	1 50 4
17	1 8 2	1 10 33	1 13 7	1 15 44	1 18 27	1 21 13	1 24 0	1 26 52	1 29 49	1 32 48	1 35 50	1 38 55	1 42 2	1 45 12	1 48 26
18	1 7 4	1 9 33	1 12 5	1 14 39	1 17 20	1 20 3	1 22 48	1 25 37	1 28 31	1 31 27	1 34 26	1 37 28	1 40 32	1 43 39	1 46 50
19	1 6 7	1 8 34	1 11 4	1 13 36	1 16 15	1 18 55	1 21 38	1 24 24	1 27 15	1 30 8	1 33 4	1 36 3	1 39 4	1 42 8	1 45 16
20	1 5 11	1 7 36	1 10 5	1 12 37	1 15 11	1 17 48	1 20 29	1 23 13	1 26 1	1 28 51	1 31 44	1 34 40	1 37 38	1 40 39	1 43 44
21	1 4 16	1 6 39	1 9 5	1 11 35	1 14 7	1 16 42	1 19 20	1 22 2	1 24 47	1 27 35	1 30 25	1 33 18	1 36 13	1 39 12	1 42 14
22	1 3 21	1 5 42	1 8 6	1 10 34	1 13 3	1 15 36	1 18 12	1 20 51	1 23 34	1 26 19	1 29 6	1 31 57	1 34 49	1 37 45	1 40 45
23	1 2 27	1 4 46	1 7 8	1 9 33	1 12 0	1 14 30	1 17 4	1 19 41	1 22 21	1 25 4	1 27 48	1 30 36	1 33 26	1 36 19	1 39 16

LATITUDE 42° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 25	0 10 29	0 10 43	0 10 57	0 11 17	0 11 41	0 12 9	0 12 42	0 13 18	0 14 0	0 14 47	0 15 37	0 16 31	0 17 30	0 18 33
1	0 10 25	0 10 30	0 10 44	0 10 58	0 11 19	0 11 43	0 12 12	0 12 45	0 13 22	0 14 5	0 14 52	0 15 43	0 16 38	0 17 38	0 18 43
2	0 10 25	0 10 31	0 10 45	0 10 59	0 11 21	0 11 45	0 12 15	0 12 49	0 13 27	0 14 10	0 14 57	0 15 49	0 16 46	0 17 47	0 18 53
3	0 10 25	0 10 32	0 10 46	0 11 0	0 11 23	0 11 47	0 12 18	0 12 53	0 13 32	0 14 16	0 15 3	0 15 56	0 16 54	0 17 56	0 19 4
4	0 10 26	0 10 33	0 10 47	0 11 1	0 11 25	0 11 49	0 12 21	0 12 57	0 13 37	0 14 22	0 15 9	0 16 3	0 17 3	0 18 6	0 19 15
5	0 10 27	0 10 34	0 10 48	0 11 2	0 11 27	0 11 51	0 12 24	0 13 1	0 13 42	0 14 28	0 15 16	0 16 11	0 17 12	0 18 16	0 19 27
6	0 10 28	0 10 35	0 10 49	0 11 3	0 11 29	0 11 54	0 12 27	0 13 5	0 13 47	0 14 34	0 15 23	0 16 20	0 17 22	0 18 27	0 19 40
7	0 10 29	0 10 36	0 10 50	0 11 5	0 11 31	0 11 57	0 12 30	0 13 9	0 13 52	0 14 40	0 15 31	0 16 29	0 17 32	0 18 39	0 19 53
8	0 10 30	0 10 37	0 10 51	0 11 7	0 11 33	0 12 0	0 12 34	0 13 13	0 13 57	0 14 46	0 15 39	0 16 38	0 17 43	0 18 51	0 20 7
9	0 10 31	0 10 38	0 10 52	0 11 9	0 11 35	0 12 3	0 12 38	0 13 17	0 14 2	0 14 53	0 15 47	0 16 48	0 17 54	0 19 4	0 20 22
10	0 10 32	0 10 40	0 10 53	0 11 11	0 11 37	0 12 6	0 12 42	0 13 21	0 14 7	0 15 0	0 15 56	0 16 59	0 18 6	0 19 18	0 20 38
11	0 10 33	0 10 42	0 10 56	0 11 14	0 11 41	0 12 10	0 12 46	0 13 26	0 14 13	0 15 8	0 16 6	0 17 10	0 18 19	0 19 33	0 20 55
12	0 10 34	0 10 44	0 10 59	0 11 17	0 11 45	0 12 15	0 12 51	0 13 32	0 14 20	0 15 17	0 16 17	0 17 22	0 18 33	0 19 49	0 21 13
13	0 10 36	0 10 46	0 11 2	0 11 20	0 11 49	0 12 20	0 12 56	0 13 38	0 14 28	0 15 27	0 16 28	0 17 35	0 18 48	0 20 6	0 21 32
14	0 10 38	0 10 48	0 11 5	0 11 24	0 11 53	0 12 26	0 13 2	0 13 45	0 14 37	0 15 38	0 16 40	0 17 49	0 19 4	0 20 24	0 21 52
15	0 10 40	0 10 50	0 11 8	0 11 28	0 11 58	0 12 32	0 13 8	0 13 53	0 14 47	0 15 49	0 16 53	0 18 4	0 19 21	0 20 43	0 22 13
16	0 10 43	0 10 53	0 11 11	0 11 32	0 12 3	0 12 38	0 13 15	0 14 2	0 14 57	0 16 1	0 17 7	0 18 20	0 19 40	0 21 4	0 22 36
17	0 10 46	0 10 56	0 11 14	0 11 36	0 12 8	0 12 44	0 13 22	0 14 11	0 15 8	0 16 14	0 17 22	0 18 37	0 20 0	0 21 26	0 23 1
18	0 10 49	0 10 59	0 11 17	0 11 40	0 12 13	0 12 50	0 13 30	0 14 21	0 15 20	0 16 27	0 17 38	0 18 55	0 20 21	0 21 50	0 23 28
19	0 10 52	0 11 2	0 11 20	0 11 44	0 12 18	0 12 56	0 13 39	0 14 32	0 15 32	0 16 41	0 17 55	0 19 14	0 20 43	0 22 15	0 23 57
20	0 10 55	0 11 5	0 11 23	0 11 48	0 12 23	0 13 2	0 13 48	0 14 43	0 15 45	0 16 56	0 18 13	0 19 35	0 21 7	0 22 42	0 24 29
21	0 10 57	0 11 8	0 11 26	0 11 52	0 12 28	0 13 9	0 13 58	0 14 54	0 15 58	0 17 12	0 18 32	0 19 57	0 21 32	0 23 11	0 25 2
22	0 10 59	0 11 11	0 11 29	0 11 56	0 12 33	0 13 16	0 14 8	0 15 6	0 16 12	0 17 28	0 18 52	0 20 21	0 21 59	0 23 43	0 25 38
23	0 11 1	0 11 13	0 11 32	0 12 1	0 12 37	0 13 24	0 14 18	0 15 18	0 16 27	0 17 45	0 19 12	0 20 46	0 22 28	0 24 19	0 26 17

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 25	0 10 29	0 10 43	0 10 57	0 11 17	0 11 41	0 12 9	0 12 42	0 13 18	0 14 0	0 14 47	0 15 37	0 16 31	0 17 30	0 18 33
1	0 10 23	0 10 27	0 10 41	0 10 55	0 11 14	0 11 38	0 12 5	0 12 38	0 13 12	0 13 55	0 14 41	0 15 29	0 16 22	0 17 20	0 18 22
2	0 10 21	0 10 25	0 10 39	0 10 53	0 11 11	0 11 35	0 12 1	0 12 34	0 13 7	0 13 50	0 14 35	0 15 21	0 16 13	0 17 10	0 18 11
3	0 10 19	0 10 23	0 10 37	0 10 50	0 11 8	0 11 32	0 11 57	0 12 30	0 13 2	0 13 44	0 14 29	0 15 13	0 16 4	0 17 0	0 18 0
4	0 10 17	0 10 21	0 10 34	0 10 47	0 11 5	0 11 29	0 11 53	0 12 26	0 12 57	0 13 38	0 14 22	0 15 5	0 15 56	0 16 51	0 17 50
5	0 10 15	0 10 19	0 10 31	0 10 44	0 11 2	0 11 25	0 11 49	0 12 21	0 12 52	0 13 32	0 14 15	0 14 57	0 15 48	0 16 42	0 17 40
6	0 10 13	0 10 17	0 10 28	0 10 41	0 10 59	0 11 21	0 11 45	0 12 16	0 12 47	0 13 26	0 14 8	0 14 50	0 15 40	0 16 33	0 17 30
7	0 10 10	0 10 15	0 10 25	0 10 38	0 10 56	0 11 17	0 11 41	0 12 11	0 12 42	0 13 20	0 14 1	0 14 43	0 15 32	0 16 24	0 17 20
8	0 10 7	0 10 13	0 10 22	0 10 35	0 10 53	0 11 13	0 11 37	0 12 6	0 12 37	0 13 14	0 13 54	0 14 36	0 15 24	0 16 15	0 17 10
9	0 10 4	0 10 10	0 10 19	0 10 32	0 10 49	0 11 9	0 11 33	0 12 1	0 12 32	0 13 8	0 13 47	0 14 29	0 15 16	0 16 6	0 17 0
10	0 10 1	0 10 7	0 10 16	0 10 29	0 10 45	0 11 5	0 11 29	0 11 56	0 12 27	0 13 2	0 13 40	0 14 22	0 15 8	0 15 57	0 16 50
11	0 9 58	0 10 4	0 10 12	0 10 25	0 10 41	0 11 1	0 11 24	0 11 51	0 12 22	0 12 56	0 13 33	0 14 15	0 15 0	0 15 48	0 16 41
12	0 9 55	0 10 1	0 10 8	0 10 21	0 10 37	0 10 57	0 11 19	0 11 46	0 12 16	0 12 50	0 13 26	0 14 8	0 14 52	0 15 39	0 16 32
13	0 9 52	0 9 57	0 10 4	0 10 17	0 10 33	0 10 53	0 11 14	0 11 41	0 12 10	0 12 44	0 13 19	0 14 1	0 14 44	0 15 30	0 16 22
14	0 9 48	0 9 53	0 10 0	0 10 13	0 10 29	0 10 48	0 11 9	0 11 36	0 12 4	0 12 38	0 13 12	0 13 54	0 14 36	0 15 21	0 16 12
15	0 9 44	0 9 49	0 9 56	0 10 9	0 10 25	0 10 43	0 11 4	0 11 31	0 11 58	0 12 32	0 13 5	0 13 46	0 14 28	0 15 12	0 16 2
16	0 9 40	0 9 45	0 9 52	0 10 5	0 10 21	0 10 38	0 10 59	0 11 26	0 11 52	0 12 26	0 12 58	0 13 38	0 14 20	0 15 3	0 15 52
17	0 9 36	0 9 41	0 9 48	0 10 1	0 10 16	0 10 33	0 10 54	0 11 20	0 11 46	0 12 19	0 12 51	0 13 30	0 14 12	0 14 54	0 15 42
18	0 9 32	0 9 37	0 9 44	0 9 57	0 10 11	0 10 28	0 10 49	0 11 14	0 11 40	0 12 12	0 12 44	0 13 22	0 14 2	0 14 45	0 15 32
19	0 9 28	0 9 33	0 9 40	0 9 52	0 10 6	0 10 23	0 10 44	0 11 8	0 11 34	0 12 5	0 12 37	0 13 14	0 13 54	0 14 36	0 15 22
20	0 9 24	0 9 29	0 9 36	0 9 47	0 10 1	0 10 18	0 10 39	0 11 2	0 11 28	0 11 58	0 12 30	0 13 6	0 13 45	0 14 27	0 15 12
21	0 9 19	0 9 24	0 9 31	0 9 42	0 9 55	0 10 12	0 10 33	0 10 55	0 11 21	0 11 50	0 12 22	0 12 57	0 13 36	0 14 17	0 15 1
22	0 9 14	0 9 18	0 9 26	0 9 36	0 9 49	0 10 6	0 10 26	0 10 48	0 11 14	0 11 42	0 12 14	0 12 48	0 13 26	0 14 7	0 14 50
23	0 9 8	0 9 12	0 9 20	0 9 30	0 9 43	0 10 0	0 10 19	0 10 41	0 11 6	0 11 34	0 12 5	0 12 39	0 13 16	0 13 56	0 14 39

LATITUDE 42° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 19 41	0 20 52	0 22 7	0 23 28	0 24 53	0 26 21	0 27 54	0 29 32	0 31 13	0 32 59	0 34 50	0 36 44	0 38 43	0 40 46	0 42 53
1	0 19 52	0 21 4	0 22 21	0 23 44	0 25 10	0 26 40	0 28 16	0 29 56	0 31 38	0 33 25	0 35 18	0 37 15	0 39 15	0 41 20	0 43 37
2	0 20 3	0 21 17	0 22 35	0 24 0	0 25 28	0 27 0	0 28 38	0 30 20	0 32 4	0 33 52	0 35 47	0 37 47	0 39 48	0 41 56	0 44 21
3	0 20 15	0 21 31	0 22 50	0 24 17	0 25 47	0 27 21	0 29 1	0 30 45	0 32 30	0 34 20	0 36 17	0 38 19	0 40 23	0 42 34	0 45 5
4	0 20 27	0 21 45	0 23 6	0 24 35	0 26 7	0 27 43	0 29 25	0 31 11	0 32 57	0 34 50	0 36 49	0 38 53	0 41 0	0 43 14	0 45 50
5	0 20 40	0 22 0	0 23 23	0 24 54	0 26 28	0 28 6	0 29 50	0 31 38	0 33 26	0 35 22	0 37 23	0 39 29	0 41 39	0 43 56	0 46 35
6	0 20 54	0 22 16	0 23 41	0 25 14	0 26 50	0 28 30	0 30 16	0 32 6	0 33 57	0 35 56	0 37 59	0 40 7	0 42 20	0 44 40	0 47 20
7	0 21 9	0 22 13	0 24 0	0 25 35	0 27 13	0 28 55	0 30 43	0 32 35	0 34 30	0 36 32	0 38 37	0 40 48	0 43 4	0 45 27	0 48 7
8	0 21 25	0 22 51	0 24 20	0 25 57	0 27 37	0 29 21	0 31 11	0 33 6	0 35 5	0 37 10	0 39 18	0 41 32	0 43 51	0 46 17	0 48 56
9	0 21 42	0 23 10	0 24 41	0 26 20	0 28 2	0 29 49	0 31 41	0 33 39	0 35 42	0 37 50	0 40 2	0 42 19	0 44 41	0 47 10	0 49 48
10	0 22 0	0 23 30	0 25 3	0 26 45	0 28 29	0 30 18	0 32 13	0 34 14	0 36 21	0 38 32	0 40 48	0 43 9	0 45 35	0 48 7	0 50 44
11	0 22 19	0 23 51	0 25 27	0 27 12	0 28 58	0 30 50	0 32 48	0 34 51	0 37 2	0 39 17	0 41 37	0 44 2	0 46 31	0 49 7	0 51 49
12	0 22 40	0 24 14	0 25 52	0 27 40	0 29 29	0 31 24	0 33 25	0 35 30	0 37 45	0 40 4	0 42 28	0 44 57	0 47 30	0 50 10	0 52 57
13	0 23 2	0 24 39	0 26 19	0 28 10	0 30 2	0 32 0	0 34 5	0 36 12	0 38 31	0 40 54	0 43 22	0 45 55	0 48 32	0 51 16	0 54 8
14	0 23 25	0 25 6	0 26 47	0 28 41	0 30 37	0 32 38	0 34 47	0 36 57	0 39 20	0 41 47	0 44 19	0 46 56	0 49 37	0 52 26	0 55 23
15	0 23 49	0 25 33	0 27 17	0 29 14	0 31 14	0 33 18	0 35 31	0 37 45	0 40 12	0 42 43	0 45 19	0 48 0	0 50 46	0 53 40	0 56 41
16	0 24 15	0 26 2	0 27 49	0 29 49	0 31 53	0 34 1	0 36 18	0 38 36	0 41 8	0 43 43	0 46 23	0 49 8	0 51 59	0 54 58	0 58 4
17	0 24 43	0 26 33	0 28 24	0 30 27	0 32 35	0 34 47	0 37 8	0 39 31	0 42 7	0 44 46	0 47 31	0 50 21	0 53 17	0 56 21	0 59 34
18	0 25 13	0 27 6	0 29 2	0 31 8	0 33 20	0 35 37	0 38 2	0 40 31	0 43 11	0 45 54	0 48 44	0 51 39	0 54 41	0 57 50	1 1 11
19	0 25 46	0 27 42	0 29 43	0 31 52	0 34 9	0 36 31	0 39 0	0 41 35	0 44 19	0 47 7	0 50 3	0 53 3	0 56 11	0 59 25	1 2 56
20	0 26 22	0 28 21	0 30 27	0 32 39	0 35 2	0 37 30	0 40 3	0 42 44	0 45 32	0 48 26	0 51 27	0 54 35	0 57 49	1 1 10	1 4 39
21	0 26 59	0 29 3	0 31 14	0 33 31	0 35 59	0 38 32	0 41 11	0 43 58	0 46 52	0 49 53	0 53 0	0 56 15	0 59 36	1 3 4	1 6 40
22	0 27 39	0 29 48	0 32 4	0 34 27	0 37 0	0 39 39	0 42 24	0 45 17	0 48 18	0 51 26	0 54 40	0 58 3	1 1 31	1 5 7	1 8 50
23	0 28 23	0 30 37	0 32 58	0 35 28	0 38 6	0 40 51	0 43 43	0 46 43	0 49 51	0 53 6	0 56 29	0 59 59	1 3 35	1 7 19	1 11 11

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 19 41	0 20 52	0 22 7	0 23 28	0 24 53	0 26 21	0 27 54	0 29 32	0 31 13	0 32 59	0 34 50	0 36 44	0 38 43	0 40 46	0 42 53
1	0 19 29	0 20 39	0 21 53	0 23 12	0 24 35	0 26 1	0 27 33	0 29 9	0 30 48	0 32 33	0 34 22	0 36 15	0 38 12	0 40 12	0 42 17
2	0 19 17	0 20 26	0 21 39	0 22 56	0 24 17	0 25 42	0 27 12	0 28 46	0 30 24	0 32 7	0 33 54	0 35 46	0 37 41	0 39 39	0 41 42
3	0 19 5	0 20 13	0 21 25	0 22 40	0 24 0	0 25 23	0 26 52	0 28 24	0 30 0	0 31 42	0 33 27	0 35 17	0 37 10	0 39 6	0 41 7
4	0 18 53	0 20 0	0 21 11	0 22 25	0 23 43	0 25 5	0 26 32	0 28 3	0 29 37	0 31 17	0 33 0	0 34 48	0 36 39	0 38 33	0 40 32
5	0 18 41	0 19 47	0 20 57	0 22 10	0 23 26	0 24 47	0 26 13	0 27 42	0 29 15	0 30 53	0 32 34	0 34 20	0 36 9	0 38 1	0 39 58
6	0 18 30	0 19 34	0 20 43	0 21 55	0 23 10	0 24 29	0 25 54	0 27 22	0 28 53	0 30 29	0 32 8	0 33 52	0 35 39	0 37 29	0 39 24
7	0 18 19	0 19 22	0 20 29	0 21 40	0 22 54	0 24 12	0 25 35	0 27 2	0 28 31	0 30 5	0 31 43	0 33 25	0 35 10	0 36 58	0 38 51
8	0 18 8	0 19 10	0 20 16	0 21 26	0 22 39	0 23 55	0 25 17	0 26 42	0 28 10	0 29 42	0 31 18	0 32 58	0 34 41	0 36 27	0 38 18
9	0 17 57	0 18 58	0 20 3	0 21 12	0 22 24	0 23 39	0 24 59	0 26 23	0 27 49	0 29 20	0 30 54	0 32 32	0 34 13	0 35 57	0 37 46
10	0 17 46	0 18 46	0 19 50	0 20 58	0 22 9	0 23 23	0 24 42	0 26 4	0 27 29	0 28 58	0 30 31	0 32 7	0 33 46	0 35 28	0 37 15
11	0 17 36	0 18 35	0 19 38	0 20 45	0 21 55	0 23 8	0 24 25	0 25 45	0 27 9	0 28 37	0 30 9	0 31 43	0 33 20	0 35 0	0 36 45
12	0 17 26	0 18 24	0 19 26	0 20 32	0 21 41	0 22 53	0 24 8	0 25 27	0 26 49	0 28 16	0 29 47	0 31 19	0 32 54	0 34 33	0 36 16
13	0 17 16	0 18 13	0 19 14	0 20 19	0 21 27	0 22 38	0 23 51	0 25 9	0 26 29	0 27 55	0 29 25	0 30 55	0 32 29	0 34 6	0 35 48
14	0 17 6	0 18 2	0 19 2	0 20 6	0 21 13	0 22 23	0 23 34	0 24 51	0 26 10	0 27 34	0 29 3	0 30 31	0 32 4	0 33 39	0 35 20
15	0 16 55	0 17 51	0 18 50	0 19 53	0 20 58	0 22 7	0 23 17	0 24 33	0 25 51	0 27 13	0 28 41	0 30 8	0 31 39	0 33 13	0 34 53
16	0 16 44	0 17 39	0 18 37	0 19 39	0 20 43	0 21 51	0 23 0	0 24 15	0 25 32	0 26 52	0 28 19	0 29 45	0 31 14	0 32 47	0 34 26
17	0 16 33	0 17 27	0 18 24	0 19 25	0 20 28	0 21 35	0 22 43	0 23 57	0 25 13	0 26 32	0 27 57	0 29 22	0 30 50	0 32 21	0 33 59
18	0 16 22	0 17 15	0 18 11	0 19 11	0 20 13	0 21 19	0 22 26	0 23 39	0 24 54	0 26 12	0 27 35	0 28 59	0 30 26	0 31 56	0 33 32
19	0 16 11	0 17 3	0 17 58	0 18 57	0 19 58	0 21 3	0 22 9	0 23 21	0 24 35	0 25 52	0 27 13	0 28 36	0 30 2	0 31 31	0 33 5
20	0 16 0	0 16 51	0 17 45	0 18 43	0 19 43	0 20 47	0 21 52	0 23 3	0 24 16	0 25 32	0 26 51	0 28 13	0 29 38	0 31 6	0 32 38
21	0 15 49	0 16 39	0 17 32	0 18 39	0 19 28	0 20 31	0 21 35	0 22 45	0 23 57	0 25 12	0 26 29	0 27 50	0 29 14	0 30 41	0 32 11
22	0 15 37	0 16 27	0 17 19	0 18 15	0 19 13	0 20 15	0 21 18	0 22 27	0 23 38	0 24 51	0 26 7	0 27 27	0 28 50	0 30 15	0 31 44
23	0 15 25	0 16 14	0 17 5	0 18 0	0 18 58	0 19 58	0 21 2	0 22 8	0 23 18	0 24 30	0 25 45	0 27 4	0 28 25	0 29 49	0 31 16

LATITUDE 42° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 45 4	0 47 18	0 49 39	0 52 3	0 54 29	0 57 1	0 59 38	1 2 17	1 5 3	1 7 52	1 10 43	1 13 41	1 16 41	1 19 45	1 22 54
1	0 45 51	0 48 8	0 50 31	0 52 58	0 55 27	0 58 3	1 0 43	1 3 25	1 6 13	1 9 6	1 11 59	1 14 59	1 18 2	1 21 9	1 24 21
2	0 46 38	0 48 58	0 51 23	0 53 54	0 56 26	0 59 5	1 1 48	1 4 34	1 7 25	1 10 20	1 13 16	1 16 18	1 19 24	1 22 35	1 25 51
3	0 47 25	0 49 48	0 52 16	0 54 50	0 57 26	1 0 8	1 2 54	1 5 44	1 8 38	1 11 35	1 14 34	1 17 39	1 20 48	1 24 3	1 27 23
4	0 48 13	0 50 39	0 53 10	0 55 47	0 58 27	1 1 12	1 4 1	1 6 55	1 9 52	1 12 51	1 15 53	1 19 1	1 22 14	1 25 33	1 28 57
5	0 49 1	0 51 30	0 54 4	0 56 44	0 59 28	1 2 16	1 5 2	1 8 6	1 11 6	1 14 8	1 17 13	1 20 24	1 23 41	1 27 5	1 30 33
6	0 49 49	0 52 21	0 54 58	0 57 41	1 0 29	1 3 20	1 6 17	1 9 17	1 12 20	1 15 27	1 18 36	1 21 52	1 25 13	1 28 41	1 32 13
7	0 50 39	0 53 14	0 55 54	0 58 40	1 1 31	1 4 26	1 7 26	1 10 30	1 13 37	1 16 49	1 20 3	1 23 24	1 26 50	1 30 21	1 33 57
8	0 51 31	0 54 9	0 56 53	0 59 42	1 2 36	1 5 35	1 8 38	1 11 46	1 14 58	1 18 15	1 21 35	1 25 1	1 28 32	1 32 7	1 35 48
9	0 52 26	0 55 8	0 57 56	1 0 49	1 3 47	1 6 49	1 9 56	1 13 8	1 16 25	1 19 47	1 23 13	1 26 44	1 30 20	1 34 0	1 37 46
10	0 53 25	0 56 11	0 59 3	1 2 1	1 5 3	1 8 10	1 11 21	1 14 37	1 17 59	1 21 26	1 24 58	1 28 34	1 32 15	1 36 0	1 39 51
11	0 54 34	0 57 24	1 1 20	1 3 22	1 6 28	1 9 40	1 12 56	1 16 17	1 19 41	1 23 13	1 26 50	1 30 31	1 34 17	1 38 7	1 42 3
12	0 55 46	0 58 40	1 2 41	1 4 46	1 7 57	1 11 14	1 14 35	1 18 1	1 21 29	1 25 6	1 28 48	1 32 34	1 36 25	1 40 21	1 44 23
13	0 57 1	1 0 0	1 4 6	1 6 15	1 9 31	1 12 53	1 16 19	1 19 50	1 23 23	1 27 5	1 30 53	1 34 45	1 38 42	1 42 44	1 46 52
14	0 58 20	1 1 24	1 5 35	1 7 49	1 11 10	1 14 37	1 18 9	1 21 45	1 25 25	1 29 12	1 33 6	1 37 4	1 41 7	1 45 16	1 49 30
15	0 59 44	1 2 53	1 6 9	1 9 29	1 12 55	1 16 27	1 20 5	1 23 47	1 27 36	1 31 29	1 35 28	1 39 32	1 43 41	1 47 57	1 52 17
16	1 1 12	1 4 27	1 7 49	1 11 15	1 14 48	1 18 24	1 22 8	1 25 56	1 29 52	1 33 52	1 37 58	1 42 9	1 46 24	1 50 47	1 55 14
17	1 2 46	1 6 7	1 9 35	1 13 7	1 16 47	1 20 30	1 24 19	1 28 14	1 32 17	1 36 24	1 40 37	1 44 55	1 49 17	1 53 47	1 58 22
18	1 4 27	1 7 54	1 11 28	1 15 6	1 18 53	1 22 44	1 26 39	1 30 41	1 34 51	1 39 6	1 43 26	1 47 51	1 52 21	1 56 59	2 1 42
19	1 6 16	1 9 49	1 13 29	1 17 13	1 21 7	1 25 6	1 29 8	1 33 18	1 37 35	1 41 58	1 46 26	1 50 59	1 55 37	2 0 23	2 5 14
20	1 8 13	1 11 52	1 15 38	1 19 30	1 23 30	1 27 36	1 31 48	1 36 6	1 40 31	1 45 2	1 49 38	1 54 19	1 59 6	2 4 0	2 8 59
21	1 10 21	1 14 7	1 18 1	1 22 1	1 26 8	1 30 20	1 34 41	1 39 8	1 43 42	1 48 22	1 53 7	1 57 56	2 2 52	2 7 55	2 13 2
22	1 12 40	1 16 34	1 20 37	1 24 46	1 29 1	1 33 22	1 37 52	1 42 29	1 47 11	1 52 0	1 56 55	2 1 55	2 7 1	2 12 13	2 17 30
23	1 15 10	1 19 15	1 23 27	1 27 47	1 32 12	1 36 43	1 41 23	1 46 10	1 51 3	1 56 1	2 1 6	2 6 18	2 11 36	2 16 59	2 22 27

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 45 4	0 47 18	0 49 39	0 52 3	0 54 29	0 57 1	0 59 38	1 2 17	1 5 3	1 7 52	1 10 43	1 13 41	1 16 41	1 19 45	1 22 54
1	0 44 26	0 46 37	0 48 55	0 51 17	0 53 40	0 56 9	0 58 43	1 1 18	1 4 0	1 6 45	1 9 34	1 12 29	1 15 26	1 18 28	1 21 34
2	0 43 48	0 45 57	0 48 12	0 50 31	0 52 52	0 55 18	0 57 49	1 0 21	1 2 59	1 5 41	1 8 27	1 11 19	1 14 13	1 17 13	1 20 16
3	0 43 11	0 45 18	0 47 30	0 49 46	0 52 5	0 54 28	0 56 56	0 59 25	1 2 0	1 4 39	1 7 22	1 10 11	1 13 2	1 15 59	1 18 59
4	0 42 34	0 44 39	0 46 49	0 49 2	0 51 19	0 53 39	0 56 4	0 58 31	1 1 3	1 3 39	1 6 19	1 9 5	1 11 53	1 14 47	1 17 44
5	0 41 58	0 44 1	0 46 8	0 48 19	0 50 34	0 52 52	0 55 14	0 57 39	1 0 8	1 2 41	1 5 18	1 8 1	1 10 46	1 13 37	1 16 31
6	0 41 22	0 43 23	0 45 28	0 47 37	0 49 50	0 52 6	0 54 25	0 56 48	0 59 15	1 1 45	1 4 19	1 6 59	1 9 41	1 12 29	1 15 20
7	0 40 47	0 42 46	0 44 49	0 46 56	0 49 6	0 51 20	0 53 37	0 55 58	0 58 23	1 0 51	1 3 22	1 5 59	1 8 38	1 11 23	1 14 11
8	0 40 12	0 42 9	0 44 10	0 46 15	0 48 23	0 50 35	0 52 50	0 55 9	0 57 32	0 59 58	1 2 27	1 5 1	1 7 37	1 10 19	1 13 4
9	0 39 38	0 41 33	0 43 32	0 45 35	0 47 41	0 49 51	0 52 4	0 54 21	0 56 42	0 59 6	1 1 33	1 4 4	1 6 38	1 9 17	1 11 59
10	0 39 5	0 40 58	0 42 55	0 44 56	0 47 0	0 49 8	0 51 19	0 53 34	0 55 53	0 58 15	1 0 40	1 3 8	1 5 40	1 8 17	1 10 56
11	0 38 33	0 40 24	0 42 19	0 44 18	0 46 20	0 48 26	0 50 35	0 52 48	0 55 5	0 57 25	0 59 48	1 2 13	1 4 43	1 7 18	1 9 55
12	0 38 2	0 39 51	0 41 44	0 43 42	0 45 42	0 47 45	0 49 53	0 52 3	0 54 18	0 56 36	0 58 57	1 1 19	1 3 47	1 6 20	1 8 55
13	0 37 32	0 39 19	0 41 10	0 43 7	0 45 5	0 47 5	0 49 11	0 51 19	0 53 32	0 55 48	0 58 7	1 0 26	1 2 52	1 5 23	1 7 56
14	0 37 2	0 38 48	0 40 37	0 42 32	0 44 29	0 46 26	0 48 30	0 50 36	0 52 47	0 55 1	0 57 18	0 59 34	1 1 59	1 4 27	1 6 58
15	0 36 33	0 38 18	0 40 5	0 41 58	0 43 54	0 45 48	0 47 50	0 49 54	0 52 3	0 54 15	0 56 30	0 58 43	1 1 7	1 3 32	1 6 1
16	0 36 4	0 37 48	0 39 34	0 41 25	0 43 19	0 45 11	0 47 11	0 49 13	0 51 20	0 53 30	0 55 42	0 57 53	1 0 15	1 2 38	1 5 4
17	0 35 36	0 37 18	0 39 3	0 40 52	0 42 44	0 44 35	0 46 33	0 48 33	0 50 38	0 52 45	0 54 55	0 57 4	0 59 24	1 1 45	1 4 8
18	0 35 8	0 36 48	0 38 32	0 40 19	0 42 9	0 43 59	0 45 55	0 47 53	0 49 56	0 52 1	0 54 8	0 56 17	0 58 34	1 0 53	1 3 13
19	0 34 40	0 36 19	0 38 1	0 39 46	0 41 34	0 43 23	0 45 17	0 47 13	0 49 14	0 51 17	0 53 22	0 55 31	0 57 45	1 0 1	1 2 19
20	0 34 12	0 35 50	0 37 30	0 39 13	0 40 59	0 42 47	0 44 39	0 46 34	0 48 32	0 50 33	0 52 37	0 54 45	0 56 56	0 59 9	1 1 25
21	0 33 44	0 35 20	0 36 58	0 38 40	0 40 24	0 42 11	0 44 1	0 45 55	0 47 51	0 49 50	0 51 53	0 53 59	0 56 7	0 58 18	1 0 32
22	0 33 15	0 34 50	0 36 26	0 38 7	0 39 49	0 41 35	0 43 24	0 45 16	0 47 11	0 49 8	0 51 9	0 53 13	0 55 19	0 57 28	0 59 40
23	0 32 46	0 34 19	0 35 54	0 37 33	0 39 15	0 41 0	0 42 47	0 44 38	0 46 31	0 48 27	0 50 26	0 52 27	0 54 31	0 56 39	0 58 49

LATITUDE 42° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 26 6	1 29 22	1 32 43	1 36 8	1 39 36	1 43 8	1 46 45	1 50 26	1 54 9	1 57 57	2 1 48	2 5 43	2 9 42	2 13 45	2 17 52
1	1 27 37	1 30 57	1 34 22	1 37 51	1 41 23	1 44 59	1 48 40	1 52 25	1 56 12	2 0 4	2 3 59	2 7 58	2 12 2	2 16 8	2 20 19
2	1 29 10	1 32 34	1 36 3	1 39 36	1 43 12	1 46 52	1 50 37	1 54 26	1 58 17	2 2 13	2 6 12	2 10 15	2 14 24	2 18 35	2 22 50
3	1 30 46	1 34 14	1 37 46	1 41 23	1 45 3	1 48 47	1 52 36	1 56 30	2 0 25	2 4 25	2 8 28	2 12 36	2 16 50	2 21 6	2 25 25
4	1 32 24	1 35 56	1 39 32	1 43 12	1 46 56	1 50 45	1 54 38	1 58 36	2 2 36	2 6 40	2 10 48	2 15 1	2 19 20	2 23 41	2 28 5
5	1 34 4	1 37 40	1 41 20	1 45 4	1 48 53	1 52 46	1 56 44	2 0 46	2 4 51	2 9 0	2 13 12	2 17 30	2 21 54	2 26 20	2 30 49
6	1 35 49	1 39 29	1 43 13	1 47 1	1 50 55	1 54 54	1 58 56	2 3 3	2 7 13	2 11 27	2 15 43	2 20 6	2 24 35	2 29 6	2 33 40
7	1 37 38	1 41 23	1 45 12	1 49 5	1 53 4	1 57 8	2 1 15	2 5 27	2 9 42	2 14 1	2 18 22	2 22 50	2 27 24	2 32 0	2 36 40
8	1 39 34	1 43 24	1 47 18	1 51 16	1 55 20	1 59 29	2 3 41	2 7 58	2 12 18	2 16 42	2 21 9	2 25 42	2 30 21	2 35 3	2 39 49
9	1 41 37	1 45 32	1 49 31	1 53 34	1 57 43	2 1 57	2 6 15	2 10 37	2 15 2	2 19 32	2 24 5	2 28 44	2 33 28	2 38 16	2 43 8
10	1 43 47	1 47 47	1 51 51	1 56 0	2 0 14	2 4 33	2 8 57	2 13 24	2 17 55	2 22 31	2 27 11	2 31 56	2 36 45	2 41 39	2 46 37
11	1 46 5	1 50 10	1 54 19	1 58 34	2 2 53	2 7 17	2 11 48	2 16 20	2 20 57	2 25 40	2 30 28	2 35 17	2 40 12	2 45 12	2 50 17
12	1 48 31	1 52 41	1 56 56	2 1 17	2 5 42	2 10 12	2 14 49	2 19 27	2 24 10	2 29 0	2 33 54	2 38 49	2 43 51	2 48 58	2 54 9
13	1 51 5	1 55 21	1 59 42	2 4 9	2 8 41	2 13 18	2 18 1	2 22 45	2 27 35	2 32 32	2 37 33	2 42 24	2 47 43	2 52 57	2 58 15
14	1 53 48	1 58 11	2 2 39	2 7 13	2 11 51	2 16 35	2 21 24	2 26 15	2 31 12	2 36 16	2 41 24	2 46 22	2 51 49	2 57 10	3 2 35
15	1 56 41	2 1 12	2 5 47	2 10 28	2 15 12	2 20 3	2 24 58	2 29 58	2 35 3	2 40 13	2 45 25	2 50 43	2 56 9	3 1 37	3 7 8
16	1 59 46	2 4 24	2 9 7	2 13 56	2 18 46	2 23 44	2 28 45	2 33 53	2 39 6	2 44 24	2 49 44	2 55 10	3 0 44	3 6 20	3 12 0
17	2 3 2	2 7 47	2 12 38	2 17 35	2 22 33	2 27 38	2 32 46	2 38 3	2 43 24	2 48 50	2 54 19	2 59 54	3 5 36	3 11 20	3 17 9
18	2 6 30	2 11 22	2 16 21	2 21 26	2 26 33	2 31 46	2 37 2	2 42 28	2 47 58	2 53 32	2 59 10	3 4 54	3 10 44	3 16 37	3 22 35
19	2 10 10	2 15 10	2 20 17	2 25 30	2 30 47	2 36 9	2 41 35	2 47 9	2 52 48	2 58 31	3 4 19	3 10 12	3 16 10	3 22 12	3 28 19
20	2 14 3	2 19 13	2 24 29	2 29 50	2 35 17	2 40 49	2 46 25	2 52 7	2 57 55	3 3 48	3 9 46	3 15 48	3 21 55	3 28 6	3 34 23
21	2 18 16	2 23 35	2 29 1	2 34 32	2 40 7	2 45 49	2 51 35	2 57 27	3 3 25	3 9 28	3 15 36	3 21 48	3 28 6	3 34 29	3 40 58
22	2 22 54	2 28 23	2 34 0	2 39 42	2 45 25	2 51 18	2 57 15	3 3 18	3 9 27	3 15 41	3 22 59	3 28 22	3 34 51	3 41 26	3 48 7
23	2 28 1	2 33 41	2 39 29	2 45 22	2 51 21	2 57 25	3 3 33	3 9 47	3 16 7	3 22 32	3 29 1	3 35 35	3 42 16	3 49 4	3 55 58

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 26 6	1 29 22	1 32 43	1 36 8	1 39 36	1 43 8	1 46 45	1 50 26	1 54 9	1 57 57	2 1 48	2 5 43	2 9 42	2 13 45	2 17 52
1	1 24 43	1 27 56	1 31 13	1 34 34	1 37 58	1 41 27	1 44 58	1 48 34	1 52 13	1 55 58	1 59 45	2 3 35	2 7 30	2 11 30	2 15 32
2	1 23 22	1 26 32	1 29 46	1 33 3	1 36 23	1 39 48	1 43 15	1 46 47	1 50 22	1 54 3	1 57 46	2 1 32	2 5 23	2 9 19	2 13 17
3	1 22 2	1 25 9	1 28 20	1 31 34	1 34 51	1 38 12	1 41 36	1 45 4	1 48 35	1 52 12	1 55 51	1 59 33	2 3 20	2 7 12	2 11 6
4	1 20 44	1 23 48	1 26 56	1 30 7	1 33 21	1 36 39	1 40 0	1 43 24	1 46 51	1 50 24	1 54 0	1 57 38	2 1 21	2 5 9	2 8 59
5	1 19 28	1 22 29	1 25 34	1 28 42	1 31 53	1 35 8	1 38 26	1 41 47	1 45 11	1 48 40	1 52 12	1 55 47	1 59 26	2 3 10	2 6 56
6	1 18 14	1 21 12	1 24 14	1 27 19	1 30 27	1 33 39	1 36 54	1 40 12	1 43 33	1 46 58	1 50 27	1 53 59	1 57 34	2 1 14	2 4 56
7	1 17 2	1 19 57	1 22 56	1 25 58	1 29 3	1 32 12	1 35 24	1 38 39	1 41 57	1 45 19	1 48 45	1 52 14	1 55 45	1 59 21	2 3 0
8	1 15 52	1 18 44	1 21 40	1 24 39	1 27 41	1 30 47	1 33 56	1 37 8	1 40 23	1 43 42	1 47 5	1 50 31	1 53 59	1 57 31	2 1 7
9	1 14 44	1 17 33	1 20 26	1 23 22	1 26 21	1 29 24	1 32 30	1 35 39	1 38 51	1 42 7	1 45 27	1 48 50	1 52 15	1 55 44	1 59 17
10	1 13 38	1 16 24	1 19 14	1 22 7	1 25 3	1 28 3	1 31 6	1 34 12	1 37 21	1 40 34	1 43 51	1 47 11	1 50 33	1 53 59	1 57 29
11	1 12 34	1 15 17	1 18 4	1 20 54	1 23 47	1 26 44	1 29 44	1 32 47	1 35 53	1 39 3	1 42 17	1 45 34	1 48 53	1 52 16	1 55 43
12	1 11 32	1 14 12	1 16 56	1 19 43	1 22 34	1 25 27	1 28 24	1 31 24	1 34 27	1 37 34	1 40 45	1 43 59	1 47 15	1 50 35	1 53 59
13	1 10 31	1 13 8	1 15 50	1 18 34	1 21 22	1 24 12	1 27 6	1 30 3	1 33 3	1 36 7	1 39 15	1 42 26	1 45 39	1 48 56	1 52 17
14	1 9 30	1 12 5	1 14 45	1 17 27	1 20 12	1 22 59	1 25 50	1 28 44	1 31 41	1 34 42	1 37 47	1 40 55	1 44 5	1 47 19	1 50 37
15	1 8 30	1 11 3	1 13 41	1 16 20	1 19 3	1 21 48	1 24 36	1 27 27	1 30 21	1 33 19	1 36 21	1 39 26	1 42 33	1 45 44	1 48 59
16	1 7 31	1 10 2	1 12 38	1 15 14	1 17 55	1 20 38	1 23 23	1 26 11	1 29 3	1 31 58	1 34 57	1 37 59	1 41 3	1 44 11	1 47 23
17	1 6 33	1 9 2	1 11 35	1 14 9	1 16 48	1 19 28	1 22 11	1 24 57	1 27 47	1 30 39	1 33 35	1 36 34	1 39 35	1 42 41	1 45 50
18	1 5 36	1 8 3	1 10 33	1 13 5	1 15 42	1 18 19	1 21 0	1 23 44	1 26 32	1 29 22	1 32 15	1 35 11	1 38 10	1 41 13	1 44 19
19	1 4 40	1 7 4	1 9 32	1 12 2	1 14 36	1 17 11	1 19 50	1 22 32	1 25 18	1 28 6	1 30 56	1 33 50	1 36 47	1 39 47	1 42 50
20	1 3 44	1 6 6	1 8 32	1 11 0	1 13 31	1 16 4	1 18 41	1 21 21	1 24 5	1 26 51	1 29 39	1 32 30	1 35 25	1 38 22	1 41 22
21	1 2 49	1 5 9	1 7 33	1 9 59	1 12 27	1 14 58	1 17 33	1 20 11	1 22 52	1 25 36	1 28 22	1 31 10	1 34 3	1 36 57	1 39 54
22	1 1 55	1 4 13	1 6 34	1 8 58	1 11 24	1 13 53	1 16 26	1 19 1	1 21 40	1 24 21	1 27 5	1 29 51	1 32 41	1 35 32	1 38 27
23	1 1 1	1 3 17	1 5 36	1 7 58	1 10 22	1 12 49	1 15 19	1 17 52	1 20 28	1 23 7	1 25 48	1 28 32	1 31 19	1 34 8	1 37 0

LATITUDE 43° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 23	0 10 28	0 10 37	0 10 54	0 11 11	0 11 35	0 12 3	0 12 34	0 13 9	0 13 48	0 14 34	0 15 24	0 16 16	0 17 10	0 18 11
1	0 10 24	0 10 30	0 10 39	0 10 56	0 11 14	0 11 38	0 12 7	0 12 39	0 13 14	0 13 54	0 14 41	0 15 32	0 16 26	0 17 21	0 18 23
2	0 10 25	0 10 32	0 10 41	0 10 58	0 11 17	0 11 41	0 12 11	0 12 44	0 13 20	0 14 1	0 14 48	0 15 40	0 16 36	0 17 32	0 18 35
3	0 10 26	0 10 34	0 10 43	0 11 0	0 11 20	0 11 44	0 12 15	0 12 49	0 13 26	0 14 8	0 14 55	0 15 48	0 16 46	0 17 43	0 18 47
4	0 10 28	0 10 36	0 10 45	0 11 2	0 11 23	0 11 47	0 12 19	0 12 54	0 13 32	0 14 15	0 15 3	0 15 57	0 16 56	0 17 54	0 19 0
5	0 10 30	0 10 38	0 10 47	0 11 4	0 11 26	0 11 51	0 12 23	0 12 59	0 13 38	0 14 22	0 15 11	0 16 6	0 17 6	0 18 6	0 19 13
6	0 10 32	0 10 40	0 10 49	0 11 7	0 11 29	0 11 55	0 12 27	0 13 4	0 13 44	0 14 29	0 15 19	0 16 15	0 17 16	0 18 18	0 19 26
7	0 10 34	0 10 42	0 10 52	0 11 10	0 11 32	0 11 59	0 12 31	0 13 9	0 13 50	0 14 36	0 15 27	0 16 24	0 17 26	0 18 30	0 19 39
8	0 10 36	0 10 44	0 10 55	0 11 13	0 11 35	0 12 3	0 12 35	0 13 14	0 13 56	0 14 43	0 15 35	0 16 33	0 17 36	0 18 42	0 19 53
9	0 10 38	0 10 46	0 10 58	0 11 16	0 11 38	0 12 7	0 12 40	0 13 19	0 14 2	0 14 50	0 15 43	0 16 42	0 17 46	0 18 54	0 20 7
10	0 10 40	0 10 48	0 11 1	0 11 19	0 11 42	0 12 11	0 12 45	0 13 24	0 14 8	0 14 57	0 15 51	0 16 51	0 17 56	0 19 6	0 20 21
11	0 10 42	0 10 50	0 11 4	0 11 21	0 11 45	0 12 15	0 12 50	0 13 30	0 14 15	0 15 5	0 16 0	0 17 0	0 18 7	0 19 19	0 20 36
12	0 10 44	0 10 52	0 11 6	0 11 23	0 11 48	0 12 19	0 12 55	0 13 36	0 14 22	0 15 13	0 16 9	0 17 10	0 18 19	0 19 33	0 20 52
13	0 10 46	0 10 54	0 11 8	0 11 25	0 11 51	0 12 23	0 13 0	0 13 42	0 14 29	0 15 21	0 16 19	0 17 21	0 18 32	0 19 48	0 21 9
14	0 10 48	0 10 56	0 11 10	0 11 28	0 11 54	0 12 27	0 13 5	0 13 48	0 14 36	0 15 30	0 16 29	0 17 33	0 18 46	0 20 4	0 21 27
15	0 10 49	0 10 58	0 11 12	0 11 31	0 11 57	0 12 31	0 13 10	0 13 54	0 14 44	0 15 40	0 16 40	0 17 46	0 19 1	0 20 21	0 21 46
16	0 10 50	0 11 0	0 11 14	0 11 34	0 12 1	0 12 35	0 13 16	0 14 1	0 14 52	0 15 50	0 16 52	0 18 0	0 19 17	0 20 39	0 22 6
17	0 10 51	0 11 1	0 11 16	0 11 37	0 12 5	0 12 40	0 13 22	0 14 8	0 15 1	0 16 1	0 17 5	0 18 15	0 19 34	0 20 58	0 22 28
18	0 10 52	0 11 2	0 11 18	0 11 40	0 12 9	0 12 45	0 13 28	0 14 15	0 15 10	0 16 12	0 17 19	0 18 31	0 19 52	0 21 18	0 22 51
19	0 10 53	0 11 3	0 11 20	0 11 43	0 12 13	0 12 50	0 13 34	0 14 23	0 15 20	0 16 24	0 17 33	0 18 48	0 20 11	0 21 40	0 23 16
20	0 10 54	0 11 4	0 11 22	0 11 46	0 12 17	0 12 55	0 13 40	0 14 31	0 15 30	0 16 36	0 17 48	0 19 6	0 20 32	0 22 4	0 23 43
21	0 10 55	0 11 6	0 11 24	0 11 49	0 12 21	0 13 1	0 13 47	0 14 40	0 15 41	0 16 49	0 18 4	0 19 25	0 20 54	0 22 29	0 24 12
22	0 10 56	0 11 8	0 11 26	0 11 52	0 12 26	0 13 7	0 13 55	0 14 50	0 15 53	0 17 3	0 18 21	0 19 45	0 21 17	0 22 56	0 24 43
23	0 10 58	0 11 10	0 11 29	0 11 56	0 12 31	0 13 14	0 14 4	0 15 1	0 16 5	0 17 18	0 18 38	0 20 6	0 21 41	0 23 25	0 25 16

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 23	0 10 28	0 10 37	0 10 54	0 11 11	0 11 35	0 12 3	0 12 34	0 13 9	0 13 48	0 14 34	0 15 24	0 16 16	0 17 10	0 18 11
1	0 10 21	0 10 26	0 10 35	0 10 52	0 11 8	0 11 32	0 11 59	0 12 30	0 13 5	0 13 42	0 14 27	0 15 16	0 16 8	0 17 1	0 18 1
2	0 10 19	0 10 24	0 10 33	0 10 49	0 11 5	0 11 29	0 11 55	0 12 26	0 13 0	0 13 36	0 14 20	0 15 8	0 16 0	0 16 52	0 17 51
3	0 10 17	0 10 22	0 10 31	0 10 46	0 11 2	0 11 26	0 11 51	0 12 22	0 12 55	0 13 30	0 14 13	0 15 0	0 15 52	0 16 43	0 17 41
4	0 10 15	0 10 20	0 10 29	0 10 43	0 10 59	0 11 23	0 11 47	0 12 18	0 12 50	0 13 24	0 14 7	0 14 53	0 15 44	0 16 34	0 17 31
5	0 10 13	0 10 18	0 10 27	0 10 40	0 10 56	0 11 20	0 11 43	0 12 14	0 12 45	0 13 18	0 14 1	0 14 46	0 15 36	0 16 25	0 17 21
6	0 10 10	0 10 16	0 10 24	0 10 37	0 10 53	0 11 16	0 11 39	0 12 10	0 12 40	0 13 13	0 13 55	0 14 39	0 15 28	0 16 16	0 17 11
7	0 10 7	0 10 13	0 10 21	0 10 34	0 10 50	0 11 12	0 11 35	0 12 5	0 12 35	0 13 8	0 13 49	0 14 32	0 15 20	0 16 7	0 17 2
8	0 10 4	0 10 10	0 10 18	0 10 31	0 10 47	0 11 8	0 11 31	0 12 0	0 12 30	0 13 3	0 13 43	0 14 25	0 15 12	0 15 59	0 16 53
9	0 10 1	0 10 7	0 10 15	0 10 28	0 10 44	0 11 4	0 11 27	0 11 55	0 12 25	0 12 58	0 13 37	0 14 18	0 15 4	0 15 51	0 16 44
10	0 9 58	0 10 4	0 10 12	0 10 25	0 10 41	0 11 0	0 11 23	0 11 50	0 12 20	0 12 53	0 13 31	0 14 11	0 14 56	0 15 43	0 16 35
11	0 9 55	0 10 1	0 10 9	0 10 22	0 10 37	0 10 56	0 11 19	0 11 45	0 12 15	0 12 48	0 13 25	0 14 4	0 14 49	0 15 35	0 16 26
12	0 9 52	0 9 58	0 10 6	0 10 19	0 10 33	0 10 52	0 11 15	0 11 40	0 12 10	0 12 43	0 13 19	0 13 57	0 14 42	0 15 27	0 16 17
13	0 9 49	0 9 55	0 10 3	0 10 16	0 10 29	0 10 48	0 11 11	0 11 35	0 12 5	0 12 38	0 13 13	0 13 50	0 14 35	0 15 19	0 16 8
14	0 9 46	0 9 52	0 10 0	0 10 13	0 10 25	0 10 44	0 11 7	0 11 30	0 12 0	0 12 32	0 13 7	0 13 43	0 14 28	0 15 11	0 15 59
15	0 9 42	0 9 49	0 9 56	0 10 9	0 10 21	0 10 40	0 11 3	0 11 25	0 11 55	0 12 26	0 13 1	0 13 36	0 14 20	0 15 3	0 15 50
16	0 9 38	0 9 45	0 9 52	0 10 5	0 10 17	0 10 36	0 10 59	0 11 20	0 11 49	0 12 20	0 12 55	0 13 29	0 14 12	0 14 55	0 15 41
17	0 9 34	0 9 41	0 9 48	0 10 1	0 10 13	0 10 32	0 10 54	0 11 15	0 11 43	0 12 14	0 12 48	0 13 22	0 14 4	0 14 46	0 15 32
18	0 9 30	0 9 37	0 9 44	0 9 57	0 10 9	0 10 27	0 10 49	0 11 10	0 11 37	0 12 8	0 12 41	0 13 15	0 13 56	0 14 37	0 15 23
19	0 9 26	0 9 33	0 9 40	0 9 52	0 10 5	0 10 22	0 10 43	0 11 5	0 11 31	0 12 1	0 12 34	0 13 8	0 13 47	0 14 28	0 15 13
20	0 9 24	0 9 29	0 9 36	0 9 47	0 10 0	0 10 17	0 10 37	0 10 59	0 11 25	0 11 54	0 12 26	0 13 0	0 13 38	0 14 19	0 15 3
21	0 9 19	0 9 23	0 9 31	0 9 41	0 9 54	0 10 11	0 10 30	0 10 52	0 11 18	0 11 46	0 12 17	0 12 51	0 13 28	0 14 9	0 14 52
22	0 9 13	0 9 16	0 9 25	0 9 34	0 9 47	0 10 4	0 10 22	0 10 44	0 11 10	0 11 37	0 12 8	0 12 42	0 13 18	0 13 58	0 14 41
23	0 9 5	0 9 9	0 9 17	0 9 27	0 9 40	0 9 56	0 10 14	0 10 36	0 11 1	0 11 28	0 11 58	0 12 32	0 13 8	0 13 47	0 14 29

LATITUDE 43° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 19 16	0 20 26	0 21 39	0 22 58	0 24 21	0 25 46	0 27 16	0 28 51	0 30 31	0 32 14	0 34 0	0 35 49	0 37 41	0 39 39	0 41 42
1	0 19 29	0 20 40	0 21 54	0 23 14	0 24 38	0 26 5	0 27 37	0 29 14	0 30 56	0 32 41	0 34 29	0 36 19	0 38 14	0 40 14	0 42 18
2	0 19 42	0 20 54	0 22 9	0 23 30	0 24 56	0 26 25	0 27 59	0 29 38	0 31 22	0 33 9	0 34 59	0 36 50	0 38 48	0 40 50	0 42 56
3	0 19 55	0 21 9	0 22 25	0 23 47	0 25 15	0 26 46	0 28 22	0 30 2	0 31 48	0 33 38	0 35 30	0 37 23	0 39 23	0 41 27	0 43 35
4	0 20 9	0 21 24	0 22 42	0 24 5	0 25 35	0 27 7	0 28 45	0 30 27	0 32 15	0 34 8	0 36 2	0 37 57	0 39 59	0 42 6	0 44 16
5	0 20 23	0 21 40	0 23 0	0 24 24	0 25 56	0 27 29	0 29 9	0 30 53	0 32 43	0 34 38	0 36 35	0 38 32	0 40 37	0 42 47	0 45 0
6	0 20 38	0 21 56	0 23 18	0 24 44	0 26 18	0 27 52	0 29 34	0 31 20	0 33 12	0 35 9	0 37 9	0 39 9	0 41 17	0 43 30	0 45 46
7	0 20 53	0 22 13	0 23 37	0 25 5	0 26 40	0 28 16	0 30 0	0 31 48	0 33 42	0 35 41	0 37 44	0 39 48	0 41 59	0 44 15	0 46 34
8	0 21 9	0 22 30	0 23 56	0 25 26	0 27 3	0 28 41	0 30 27	0 32 18	0 34 14	0 36 15	0 38 21	0 40 29	0 42 43	0 45 2	0 47 24
9	0 21 25	0 22 48	0 24 16	0 25 48	0 27 27	0 29 8	0 30 56	0 32 50	0 34 48	0 36 51	0 39 0	0 41 12	0 43 29	0 45 51	0 48 16
10	0 21 41	0 23 7	0 24 37	0 26 11	0 27 52	0 29 37	0 31 27	0 33 23	0 35 23	0 37 29	0 39 41	0 41 57	0 44 17	0 46 42	0 49 11
11	0 21 58	0 23 27	0 24 59	0 26 35	0 28 18	0 30 7	0 31 59	0 33 57	0 35 59	0 38 8	0 40 24	0 42 43	0 45 7	0 47 36	0 50 9
12	0 22 16	0 23 48	0 25 21	0 27 1	0 28 45	0 30 38	0 32 33	0 34 33	0 36 37	0 38 50	0 41 9	0 43 32	0 46 0	0 48 33	0 51 10
13	0 22 35	0 24 10	0 25 46	0 27 29	0 29 14	0 31 10	0 33 8	0 35 11	0 37 18	0 39 35	0 41 57	0 44 23	0 46 55	0 49 32	0 52 13
14	0 22 56	0 24 33	0 26 12	0 27 58	0 29 45	0 31 44	0 33 45	0 35 51	0 38 2	0 40 23	0 42 48	0 45 17	0 47 53	0 50 34	0 53 19
15	0 23 18	0 24 57	0 26 39	0 28 28	0 30 18	0 32 20	0 34 24	0 36 34	0 38 49	0 41 14	0 43 42	0 46 14	0 48 54	0 51 39	0 54 28
16	0 23 41	0 25 22	0 27 7	0 29 0	0 30 53	0 32 58	0 35 6	0 37 20	0 39 39	0 42 8	0 44 39	0 47 15	0 49 59	0 52 48	0 55 42
17	0 24 5	0 25 49	0 27 37	0 29 33	0 31 31	0 33 39	0 35 51	0 38 9	0 40 32	0 43 5	0 45 40	0 48 20	0 51 9	0 54 3	0 57 2
18	0 24 31	0 26 18	0 28 9	0 30 8	0 32 12	0 34 23	0 36 39	0 39 1	0 41 28	0 44 5	0 46 45	0 49 31	0 52 25	0 55 21	0 58 27
19	0 24 59	0 26 49	0 28 43	0 30 46	0 32 55	0 35 10	0 37 30	0 39 57	0 42 29	0 45 10	0 47 56	0 50 48	0 53 57	0 56 48	1 0 1
20	0 25 29	0 27 22	0 29 21	0 31 28	0 33 41	0 36 0	0 38 25	0 40 57	0 43 35	0 46 21	0 49 13	0 52 12	0 55 15	0 58 25	1 1 42
21	0 26 1	0 27 58	0 30 2	0 32 13	0 34 31	0 36 55	0 39 26	0 42 3	0 44 47	0 47 38	0 50 36	0 53 41	0 56 50	1 0 7	1 3 30
22	0 26 36	0 28 38	0 30 46	0 33 2	0 35 25	0 37 55	0 40 31	0 43 14	0 46 4	0 49 1	0 52 5	0 55 16	0 58 32	1 1 56	1 5 26
23	0 27 14	0 29 21	0 31 35	0 33 56	0 36 24	0 38 59	0 41 41	0 44 30	0 47 26	0 50 29	0 53 40	0 56 58	1 0 22	1 3 53	1 7 32

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 19 16	0 20 26	0 21 39	0 22 58	0 24 21	0 25 46	0 27 16	0 28 51	0 30 31	0 32 13	0 34 0	0 35 49	0 37 41	0 39 39	0 41 42
1	0 19 5	0 20 14	0 21 26	0 22 43	0 24 5	0 25 29	0 26 55	0 28 28	0 30 6	0 31 46	0 33 31	0 35 19	0 37 10	0 39 6	0 41 7
2	0 18 54	0 20 2	0 21 13	0 22 28	0 24 49	0 25 12	0 26 34	0 28 6	0 29 42	0 31 20	0 33 3	0 34 49	0 36 39	0 38 33	0 40 32
3	0 18 43	0 19 50	0 21 0	0 22 13	0 24 33	0 24 55	0 26 14	0 27 44	0 29 18	0 30 55	0 32 36	0 34 20	0 36 9	0 38 1	0 39 58
4	0 18 32	0 19 38	0 21 47	0 21 58	0 24 17	0 24 38	0 25 55	0 27 23	0 28 55	0 30 31	0 32 10	0 33 52	0 35 40	0 37 30	0 39 25
5	0 18 21	0 19 26	0 21 34	0 21 43	0 24 1	0 24 21	0 25 37	0 27 3	0 28 33	0 30 7	0 31 45	0 33 25	0 35 12	0 37 0	0 38 53
6	0 18 10	0 19 14	0 21 21	0 21 29	0 23 45	0 24 4	0 25 19	0 26 43	0 28 12	0 29 44	0 31 21	0 32 59	0 34 44	0 36 31	0 38 22
7	0 17 59	0 19 2	0 21 8	0 21 15	0 23 29	0 23 47	0 25 2	0 26 24	0 27 52	0 29 22	0 30 58	0 32 34	0 34 17	0 36 2	0 37 51
8	0 17 49	0 18 50	0 20 55	0 21 1	0 23 14	0 23 30	0 24 45	0 26 6	0 27 32	0 29 1	0 30 35	0 32 10	0 33 51	0 35 34	0 37 21
9	0 17 39	0 18 39	0 20 42	0 20 48	0 22 59	0 23 13	0 24 29	0 25 49	0 27 13	0 28 41	0 30 13	0 31 47	0 33 26	0 35 7	0 36 52
10	0 17 29	0 18 28	0 19 30	0 20 35	0 21 44	0 22 57	0 24 13	0 25 32	0 26 55	0 28 22	0 29 52	0 31 25	0 33 2	0 34 41	0 36 24
11	0 17 20	0 18 18	0 19 19	0 20 23	0 21 30	0 22 42	0 23 58	0 25 16	0 26 37	0 28 3	0 29 32	0 31 3	0 32 39	0 34 16	0 35 57
12	0 17 11	0 18 8	0 19 8	0 20 11	0 21 16	0 22 27	0 23 43	0 24 59	0 26 19	0 27 44	0 29 12	0 30 41	0 32 16	0 33 51	0 35 31
13	0 17 2	0 17 58	0 18 57	0 19 59	0 21 3	0 22 12	0 23 27	0 24 42	0 26 1	0 27 25	0 28 52	0 30 19	0 31 53	0 33 27	0 35 5
14	0 16 52	0 17 48	0 18 45	0 19 47	0 20 50	0 21 57	0 23 11	0 24 25	0 25 43	0 27 6	0 28 31	0 29 57	0 31 30	0 33 3	0 34 39
15	0 16 42	0 17 37	0 18 33	0 19 34	0 20 37	0 21 43	0 22 55	0 24 8	0 25 25	0 26 47	0 28 10	0 29 35	0 31 7	0 32 39	0 34 13
16	0 16 32	0 17 26	0 18 21	0 19 21	0 20 24	0 21 29	0 22 39	0 23 51	0 25 7	0 26 28	0 27 49	0 29 13	0 30 44	0 32 14	0 33 47
17	0 16 22	0 17 15	0 18 9	0 19 8	0 20 10	0 21 15	0 22 23	0 23 34	0 24 49	0 26 8	0 27 28	0 28 51	0 30 20	0 31 49	0 33 21
18	0 16 12	0 17 4	0 17 57	0 18 55	0 19 56	0 21 0	0 22 7	0 23 17	0 24 31	0 25 48	0 27 7	0 28 29	0 29 56	0 31 24	0 32 55
19	0 16 1	0 16 52	0 17 45	0 18 42	0 19 42	0 20 45	0 21 51	0 23 0	0 24 13	0 25 28	0 26 46	0 28 7	0 29 32	0 30 59	0 32 29
20	0 15 50	0 16 40	0 17 33	0 18 29	0 19 28	0 20 30	0 21 35	0 22 43	0 23 54	0 25 8	0 26 25	0 27 45	0 29 8	0 30 34	0 32 3
21	0 15 38	0 16 27	0 17 20	0 18 15	0 19 13	0 20 14	0 21 18	0 22 25	0 23 35	0 24 48	0 26 4	0 27 22	0 28 44	0 30 9	0 31 37
22	0 15 26	0 16 14	0 17 6	0 18 0	0 18 57	0 19 58	0 21 1	0 22 7	0 23 15	0 24 27	0 25 42	0 26 59	0 28 20	0 29 44	0 31 10
23	0 15 13	0 16 1	0 16 52	0 17 45	0 18 41	0 19 41	0 20 43	0 21 48	0 22 55	0 24 6	0 25 20	0 26 36	0 27 55	0 29 18	0 30 43

LATITUDE 43° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 43 51	0 46 1	0 48 14	0 50 34	0 52 58	0 55 25	0 57 56	1 0 30	1 3 9	1 5 53	1 8 38	1 11 30	1 14 24	1 17 23	1 20 25
1	0 44 29	0 46 40	0 48 56	0 51 18	0 53 45	0 56 15	0 58 49	1 1 27	1 4 9	1 6 55	1 9 43	1 12 38	1 15 36	1 18 38	1 21 43
2	0 45 9	0 47 21	0 49 39	0 52 4	0 54 35	0 57 8	0 59 45	1 2 26	1 5 11	1 8 0	1 10 51	1 13 49	1 16 51	1 19 57	1 23 5
3	0 45 51	0 48 4	0 50 25	0 52 53	0 55 27	0 58 3	1 0 43	1 3 27	1 6 15	1 9 9	1 12 3	1 15 4	1 18 9	1 21 19	1 24 31
4	0 46 35	0 48 50	0 51 14	0 53 45	0 56 22	0 59 1	1 1 44	1 4 31	1 7 22	1 10 21	1 13 19	1 16 23	1 19 31	1 22 44	1 26 0
5	0 47 21	0 49 39	0 52 6	0 54 40	0 57 20	1 0 2	1 2 48	1 5 38	1 8 32	1 11 36	1 14 38	1 17 45	1 20 57	1 24 13	1 27 33
6	0 48 9	0 50 31	0 53 1	0 55 38	0 58 21	1 1 6	1 3 55	1 6 48	1 9 46	1 12 54	1 16 0	1 19 10	1 22 26	1 25 46	1 29 10
7	0 48 59	0 51 26	0 53 59	0 56 39	0 59 25	1 2 13	1 5 5	1 8 2	1 11 4	1 14 15	1 17 25	1 20 39	1 23 59	1 27 23	1 30 51
8	0 49 52	0 52 23	0 55 0	0 57 43	1 0 32	1 3 23	1 6 19	1 9 20	1 12 26	1 15 39	1 18 53	1 22 11	1 25 35	1 29 4	1 32 36
9	0 50 47	0 53 23	0 56 4	0 58 50	1 1 42	1 4 37	1 7 37	1 10 42	1 13 52	1 17 7	1 20 25	1 23 48	1 27 16	1 30 49	1 34 26
10	0 51 46	0 54 26	0 57 11	1 0 1	1 2 56	1 5 55	1 8 59	1 12 8	1 15 22	1 18 40	1 22 3	1 25 30	1 29 2	1 32 40	1 36 22
11	0 51 48	0 55 32	0 58 21	1 1 16	1 4 15	1 7 17	1 10 25	1 13 37	1 16 56	1 20 18	1 23 45	1 27 17	1 30 55	1 34 36	1 38 24
12	0 52 53	0 56 41	0 59 34	1 2 34	1 5 37	1 8 43	1 11 55	1 15 10	1 18 34	1 22 1	1 25 32	1 29 9	1 32 53	1 36 38	1 40 31
13	0 54 1	0 57 53	1 0 50	1 3 55	1 7 3	1 10 13	1 13 29	1 16 48	1 20 17	1 23 49	1 27 25	1 31 7	1 34 57	1 38 47	1 42 45
14	0 55 12	0 59 8	1 2 10	1 5 20	1 8 33	1 11 47	1 15 8	1 18 31	1 22 5	1 25 43	1 29 24	1 33 12	1 37 9	1 41 3	1 45 6
15	0 56 26	1 0 27	1 3 34	1 6 49	1 10 7	1 13 26	1 16 52	1 20 20	1 23 59	1 27 43	1 31 31	1 35 24	1 39 28	1 43 26	1 47 35
16	0 57 45	1 1 51	1 5 3	1 8 23	1 11 46	1 15 10	1 18 42	1 22 16	1 26 0	1 29 51	1 33 45	1 37 45	1 41 53	1 45 58	1 50 14
17	0 59 10	1 3 21	1 6 38	1 10 3	1 13 31	1 17 1	1 20 39	1 24 20	1 28 10	1 32 7	1 36 8	1 40 15	1 44 28	1 48 41	1 53 4
18	1 1 41	1 4 58	1 8 20	1 11 50	1 15 24	1 19 0	1 22 45	1 26 33	1 30 29	1 34 33	1 38 41	1 42 55	1 47 14	1 51 36	1 56 6
19	1 3 19	1 6 42	1 10 10	1 13 45	1 17 26	1 21 9	1 25 1	1 28 56	1 32 59	1 37 10	1 41 25	1 45 46	1 50 12	1 54 43	1 59 20
20	1 5 5	1 8 34	1 12 8	1 15 49	1 19 38	1 23 29	1 27 28	1 31 32	1 35 42	1 39 59	1 44 21	1 48 49	1 53 22	1 58 2	2 2 47
21	1 7 0	1 10 35	1 14 16	1 18 4	1 22 0	1 26 0	1 30 7	1 34 19	1 38 37	1 43 1	1 47 31	1 52 8	1 56 48	2 1 37	2 6 30
22	1 9 3	1 12 46	1 16 34	1 20 30	1 24 33	1 28 42	1 32 58	1 37 18	1 41 45	1 46 17	1 50 56	1 55 42	2 0 31	2 5 28	2 10 31
23	1 11 16	1 15 7	1 19 4	1 23 8	1 27 19	1 31 37	1 36 1	1 40 30	1 45 6	1 49 48	1 54 36	1 59 31	2 4 32	2 9 38	2 14 50

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 43 51	0 46 1	0 48 14	0 50 34	0 52 58	0 55 25	0 57 56	1 0 30	1 3 9	1 5 53	1 8 38	1 11 30	1 14 24	1 17 23	1 20 25
1	0 43 13	0 45 21	0 47 32	0 49 50	0 52 10	0 54 34	0 57 2	0 59 33	1 2 9	1 4 49	1 7 31	1 10 19	1 13 10	1 16 6	1 19 5
2	0 42 36	0 44 42	0 46 51	0 49 7	0 51 24	0 53 45	0 56 10	0 58 39	1 1 12	1 3 48	1 6 27	1 9 12	1 12 0	1 14 53	1 17 49
3	0 42 0	0 44 4	0 46 11	0 48 25	0 50 39	0 52 58	0 55 20	0 57 47	1 0 17	1 2 50	1 5 26	1 8 8	1 10 53	1 13 43	1 16 36
4	0 41 25	0 43 27	0 45 32	0 47 43	0 49 55	0 52 12	0 54 32	0 56 56	0 59 24	1 1 54	1 4 27	1 7 6	1 9 49	1 12 36	1 15 26
5	0 40 51	0 42 51	0 44 54	0 47 2	0 49 12	0 51 27	0 53 45	0 56 7	0 58 32	1 1 0	1 3 31	1 6 6	1 8 47	1 11 31	1 14 18
6	0 40 17	0 42 15	0 44 17	0 46 22	0 48 30	0 50 43	0 52 59	0 55 19	0 57 42	1 0 1	1 2 36	1 5 9	1 7 47	1 10 28	1 13 12
7	0 39 44	0 41 40	0 43 40	0 45 43	0 47 49	0 50 0	0 52 14	0 54 32	0 56 53	0 59 16	1 1 43	1 4 14	1 6 49	1 9 27	1 12 8
8	0 39 12	0 41 6	0 43 4	0 45 5	0 47 9	0 49 18	0 51 30	0 53 46	0 56 5	0 58 26	1 0 51	1 3 20	1 5 52	1 8 28	1 11 6
9	0 38 41	0 40 33	0 42 29	0 44 28	0 46 30	0 48 37	0 50 47	0 53 1	0 55 18	0 57 37	1 0 0	1 2 27	1 4 57	1 7 30	1 10 6
10	0 38 11	0 40 1	0 41 55	0 43 52	0 45 52	0 47 57	0 50 5	0 52 17	0 54 32	0 56 49	0 59 10	1 1 35	1 4 3	1 6 34	1 9 8
11	0 37 42	0 39 30	0 41 22	0 43 17	0 45 15	0 47 18	0 49 24	0 51 34	0 53 47	0 56 2	0 58 21	1 0 44	1 3 10	1 5 39	1 8 11
12	0 37 13	0 39 0	0 40 50	0 42 43	0 44 39	0 46 40	0 48 44	0 50 52	0 53 3	0 55 16	0 57 33	0 59 54	1 2 18	1 4 45	1 7 15
13	0 36 45	0 38 30	0 40 18	0 42 10	0 44 4	0 46 3	0 48 5	0 50 11	0 52 20	0 54 31	0 56 46	0 59 5	1 1 27	1 3 52	1 6 20
14	0 36 17	0 38 0	0 39 47	0 41 38	0 43 30	0 45 27	0 47 27	0 49 31	0 51 38	0 53 47	0 56 0	0 58 17	1 0 37	1 3 0	1 5 26
15	0 35 50	0 37 31	0 39 17	0 41 7	0 42 57	0 44 52	0 46 50	0 48 52	0 50 56	0 53 4	0 55 15	0 57 30	0 59 47	1 2 8	1 4 32
16	0 35 23	0 37 2	0 38 47	0 40 36	0 42 24	0 44 17	0 46 13	0 48 13	0 50 15	0 52 21	0 54 30	0 56 43	0 58 58	1 1 17	1 3 39
17	0 34 56	0 36 34	0 38 18	0 40 5	0 41 51	0 43 42	0 45 36	0 47 35	0 49 35	0 51 39	0 53 46	0 55 56	0 58 9	1 0 26	1 2 46
18	0 34 29	0 36 6	0 37 48	0 39 33	0 41 19	0 43 7	0 45 0	0 46 57	0 48 55	0 50 57	0 53 2	0 55 10	0 57 21	0 59 36	1 1 53
19	0 34 2	0 35 38	0 37 18	0 39 1	0 40 46	0 42 33	0 44 24	0 46 19	0 48 15	0 50 15	0 52 18	0 54 24	0 56 33	0 58 46	1 1 1
20	0 33 35	0 35 10	0 36 48	0 38 29	0 40 13	0 41 59	0 43 48	0 45 41	0 47 35	0 49 33	0 51 34	0 53 38	0 55 45	0 57 56	1 0 9
21	0 33 7	0 34 41	0 36 17	0 37 57	0 39 39	0 41 24	0 43 12	0 45 3	0 46 55	0 48 51	0 50 51	0 52 53	0 54 58	0 57 6	0 59 17
22	0 32 39	0 34 11	0 35 46	0 37 25	0 39 5	0 40 49	0 42 35	0 44 25	0 46 16	0 48 10	0 50 8	0 52 8	0 54 11	0 56 17	0 58 26
23	0 32 11	0 33 41	0 35 15	0 36 52	0 38 31	0 40 13	0 41 58	0 43 46	1 45 37	0 47 29	0 49 25	0 51 23	0 53 24	0 55 28	0 57 35

LATITUDE 43° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 23 31	1 26 41	1 29 56	1 33 13	1 36 34	1 40 0	1 43 29	1 47 3	1 50 39	1 54 19	1 58 4	2 1 52	2 5 43	2 9 38	2 13 37
1	1 24 53	1 28 6	1 31 25	1 34 46	1 38 11	1 41 40	1 45 13	1 48 50	1 52 30	1 56 14	2 0 3	2 3 56	2 7 51	2 11 50	2 15 53
2	1 26 18	1 29 35	1 32 57	1 36 22	1 39 51	1 43 24	1 47 1	1 50 42	1 54 26	1 58 14	2 2 7	2 6 4	2 10 3	2 14 6	2 18 13
3	1 27 47	1 31 8	1 34 33	1 38 2	1 41 35	1 45 12	1 48 53	1 52 38	1 56 26	2 0 18	2 4 15	2 8 16	2 12 19	2 16 26	2 20 37
4	1 29 20	1 32 45	1 36 13	1 39 46	1 43 23	1 47 4	1 50 49	1 54 38	1 58 30	2 2 26	2 6 27	2 10 32	2 14 40	2 18 51	2 23 6
5	1 30 57	1 34 25	1 37 58	1 41 34	1 45 15	1 49 0	1 52 49	1 56 42	2 0 39	2 4 39	2 8 44	2 12 53	2 17 6	2 21 22	2 25 41
6	1 32 38	1 36 10	1 39 47	1 43 27	1 47 12	1 51 1	1 54 54	1 58 51	2 2 53	2 6 58	2 11 7	2 15 21	2 19 39	2 24 0	2 28 24
7	1 34 23	1 37 59	1 41 40	1 45 24	1 49 14	1 53 8	1 57 5	2 1 6	2 5 13	2 9 23	2 13 37	2 17 56	2 22 19	2 26 45	2 31 14
8	1 36 12	1 39 52	1 43 38	1 47 27	1 51 21	1 55 20	1 59 22	2 3 28	2 7 40	2 11 55	2 16 14	2 20 38	2 25 6	2 29 37	2 34 12
9	1 38 6	1 41 51	1 45 42	1 49 36	1 53 34	1 57 38	2 1 46	2 5 57	2 10 14	2 14 34	2 18 58	2 23 27	2 28 0	2 32 37	2 37 18
10	1 40 7	1 43 57	1 47 52	1 51 51	1 55 55	2 0 4	2 4 17	2 8 34	2 12 56	2 17 21	2 21 50	2 26 24	2 31 2	2 35 45	2 40 32
11	1 42 14	1 46 9	1 50 8	1 54 13	1 58 23	2 2 37	2 6 55	2 11 18	2 15 46	2 20 16	2 24 51	2 29 30	2 34 13	2 39 2	2 43 55
12	1 44 27	1 48 28	1 52 32	1 56 43	2 0 58	2 5 17	2 9 41	2 14 10	2 18 44	2 23 20	2 28 1	2 32 46	2 37 34	2 42 29	2 47 28
13	1 46 47	1 50 54	1 55 4	1 59 20	2 3 41	2 8 5	2 12 35	2 17 10	2 21 50	2 26 33	2 31 20	2 36 11	2 41 5	2 46 6	2 51 12
14	1 49 14	1 53 27	1 57 43	2 2 5	2 6 32	2 11 2	2 15 38	2 20 19	2 25 5	2 29 55	2 34 49	2 39 46	2 44 47	2 49 55	2 55 8
15	1 51 49	1 56 8	2 0 32	2 5 0	2 9 32	2 14 9	2 18 51	2 23 38	2 28 30	2 33 27	2 38 28	2 43 33	2 48 42	2 53 56	2 59 16
16	1 54 34	1 59 0	2 3 31	2 8 6	2 12 44	2 17 28	2 22 17	2 27 10	2 32 8	2 37 13	2 42 22	2 47 35	2 52 51	2 58 12	3 3 40
17	1 57 31	2 2 4	2 6 42	2 11 24	2 16 9	2 21 1	2 25 57	2 30 58	2 36 1	2 41 14	2 46 31	2 51 52	2 57 15	3 2 44	3 8 20
18	2 0 40	2 5 20	2 10 5	2 14 54	2 19 47	2 24 47	2 29 51	2 35 0	2 40 10	2 45 31	2 50 56	2 56 25	3 1 56	3 7 33	3 13 17
19	2 4 1	2 8 48	2 13 40	2 18 37	2 23 39	2 28 47	2 33 59	2 39 16	2 44 36	2 50 5	2 55 38	3 1 15	3 6 55	3 12 41	3 18 33
20	2 7 36	2 12 30	2 17 30	2 22 35	2 27 46	2 33 2	2 38 23	2 43 49	2 49 21	2 54 58	3 0 39	3 6 24	3 12 14	3 18 9	3 24 9
21	2 11 28	2 16 30	2 21 39	2 26 53	2 32 12	2 37 37	2 43 8	2 48 43	2 54 25	3 0 11	3 6 2	3 11 56	3 17 56	3 24 0	3 30 9
22	2 15 38	2 20 49	2 26 8	2 31 32	2 37 0	2 42 36	2 48 16	2 54 0	2 59 52	3 5 47	3 11 48	3 17 52	3 24 2	3 30 16	3 36 35
23	2 20 7	2 25 29	2 30 58	2 36 32	2 42 12	2 47 58	2 53 49	2 59 44	3 5 44	3 11 50	3 18 1	3 24 16	3 30 36	3 37 1	3 43 31

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 23 31	1 26 41	1 29 56	1 33 13	1 36 34	1 40 0	1 43 29	1 47 3	1 50 39	1 54 19	1 58 4	2 1 52	2 5 43	2 9 38	2 13 37
1	1 22 9	1 25 16	1 28 28	1 31 42	1 35 0	1 38 23	1 41 49	1 45 19	1 48 52	1 52 27	1 56 9	1 59 53	2 3 40	2 7 32	2 11 27
2	1 20 51	1 23 55	1 27 4	1 30 15	1 33 30	1 36 50	1 40 13	1 43 39	1 47 8	1 50 40	1 54 18	1 57 58	2 1 41	2 5 30	2 9 21
3	1 19 35	1 22 37	1 25 43	1 28 51	1 32 3	1 35 20	1 38 39	1 42 2	1 45 28	1 48 56	1 52 30	1 56 6	1 59 46	2 3 31	2 7 18
4	1 18 22	1 21 21	1 24 24	1 27 30	1 30 39	1 33 52	1 37 8	1 40 27	1 43 50	1 47 15	1 50 45	1 54 18	1 57 54	2 1 35	2 5 18
5	1 17 11	1 20 7	1 23 7	1 26 10	1 29 16	1 32 26	1 35 39	1 38 55	1 42 15	1 45 37	1 49 3	1 52 33	1 56 5	1 59 42	2 3 21
6	1 16 2	1 18 55	1 21 52	1 24 52	1 27 55	1 31 2	1 34 12	1 37 25	1 40 42	1 44 1	1 47 24	1 50 50	1 54 19	1 57 52	2 1 27
7	1 14 55	1 17 45	1 20 39	1 23 36	1 26 36	1 29 40	1 32 47	1 35 57	1 39 11	1 42 27	1 45 47	1 49 10	1 52 36	1 56 5	1 59 36
8	1 13 50	1 16 37	1 19 28	1 22 22	1 25 19	1 28 20	1 31 24	1 34 31	1 37 42	1 40 55	1 44 12	1 47 32	1 50 55	1 54 21	1 57 48
9	1 12 47	1 15 31	1 18 19	1 21 10	1 24 4	1 27 2	1 30 3	1 33 7	1 36 15	1 39 25	1 42 39	1 45 56	1 49 16	1 52 39	1 56 3
10	1 11 46	1 14 27	1 17 12	1 20 0	1 22 51	1 25 46	1 28 44	1 31 45	1 34 50	1 37 57	1 41 8	1 44 22	1 47 39	1 50 59	1 54 21
11	1 10 47	1 13 25	1 16 7	1 18 52	1 21 40	1 24 32	1 27 27	1 30 25	1 33 27	1 36 31	1 39 39	1 42 50	1 46 4	1 49 21	1 52 41
12	1 9 49	1 12 25	1 15 4	1 17 46	1 20 31	1 23 20	1 26 12	1 29 7	1 32 6	1 35 7	1 38 12	1 41 20	1 44 31	1 47 45	1 51 3
13	1 8 52	1 11 25	1 14 2	1 16 41	1 19 24	1 22 10	1 24 59	1 27 51	1 30 47	1 33 45	1 36 47	1 39 52	1 43 0	1 46 11	1 49 27
14	1 7 55	1 10 26	1 13 1	1 15 37	1 18 18	1 21 1	1 23 48	1 26 37	1 29 30	1 32 25	1 35 24	1 38 26	1 41 32	1 44 40	1 47 53
15	1 6 59	1 9 28	1 12 1	1 14 34	1 17 13	1 19 53	1 22 38	1 25 25	1 28 15	1 31 7	1 34 3	1 37 3	1 40 6	1 43 11	1 46 21
16	1 6 3	1 8 30	1 11 1	1 13 32	1 16 9	1 18 46	1 21 29	1 24 14	1 27 2	1 29 51	1 32 44	1 35 42	1 38 42	1 41 44	1 44 51
17	1 5 8	1 7 32	1 10 1	1 12 31	1 15 5	1 17 40	1 20 21	1 23 4	1 25 49	1 28 37	1 31 27	1 34 23	1 37 20	1 40 19	1 43 24
18	1 4 13	1 6 35	1 9 2	1 11 30	1 14 2	1 16 35	1 19 13	1 21 54	1 24 37	1 27 23	1 30 12	1 33 5	1 35 59	1 38 56	1 41 58
19	1 3 18	1 5 38	1 8 3	1 10 29	1 12 59	1 15 30	1 18 6	1 20 45	1 23 26	1 26 10	1 28 57	1 31 47	1 34 39	1 37 34	1 40 33
20	1 2 24	1 4 42	1 7 5	1 9 29	1 11 56	1 14 26	1 17 0	1 19 36	1 22 15	1 24 57	1 27 42	1 30 29	1 33 19	1 36 12	1 39 8
21	1 1 31	1 3 47	1 6 8	1 8 30	1 10 54	1 13 22	1 15 54	1 18 28	1 21 4	1 23 44	1 26 27	1 29 11	1 31 59	1 34 50	1 37 43
22	1 0 38	1 2 53	1 5 11	1 7 31	1 9 53	1 12 19	1 14 49	1 17 20	1 19 54	1 22 32	1 25 12	1 27 54	1 30 39	1 33 28	1 36 18
23	0 59 46	1 1 59	1 4 14	1 6 32	1 8 53	1 11 16	1 13 44	1 16 13	1 18 45	1 21 20	1 23 57	1 26 37	1 29 20	1 32 6	1 34 54

LATITUDE 44° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 21	0 10 27	0 10 37	0 10 51	0 11 9	0 11 32	0 11 59	0 12 29	0 13 3	0 13 42	0 14 25	0 15 11	0 16 2	0 16 57	0 17 56
1	0 10 23	0 10 29	0 10 40	0 10 54	0 11 11	0 11 35	0 12 2	0 12 33	0 13 8	0 13 48	0 14 32	0 15 19	0 16 11	0 17 7	0 18 7
2	0 10 25	0 10 31	0 10 42	0 10 57	0 11 14	0 11 38	0 12 5	0 12 37	0 13 13	0 13 54	0 14 39	0 15 27	0 16 20	0 17 17	0 18 18
3	0 10 27	0 10 33	0 10 44	0 11 0	0 11 17	0 11 41	0 12 9	0 12 41	0 13 18	0 14 0	0 14 46	0 15 35	0 16 29	0 17 27	0 18 30
4	0 10 29	0 10 35	0 10 46	0 11 3	0 11 20	0 11 44	0 12 13	0 12 45	0 13 23	0 14 6	0 14 53	0 15 43	0 16 38	0 17 37	0 18 42
5	0 10 31	0 10 37	0 10 48	0 11 5	0 11 23	0 11 47	0 12 17	0 12 50	0 13 28	0 14 12	0 15 0	0 15 51	0 16 47	0 17 48	0 18 54
6	0 10 33	0 10 39	0 10 50	0 11 7	0 11 26	0 11 50	0 12 21	0 12 55	0 13 33	0 14 18	0 15 7	0 15 59	0 16 56	0 17 59	0 19 6
7	0 10 35	0 10 41	0 10 52	0 11 9	0 11 29	0 11 53	0 12 25	0 13 0	0 13 39	0 14 24	0 15 14	0 16 7	0 17 6	0 18 10	0 19 18
8	0 10 36	0 10 43	0 10 54	0 11 11	0 11 32	0 11 57	0 12 29	0 13 5	0 13 45	0 14 30	0 15 21	0 16 16	0 17 16	0 18 21	0 19 30
9	0 10 37	0 10 44	0 10 56	0 11 13	0 11 35	0 12 1	0 12 33	0 13 10	0 13 51	0 14 37	0 15 29	0 16 25	0 17 26	0 18 32	0 19 42
10	0 10 38	0 10 45	0 10 58	0 11 15	0 11 38	0 12 5	0 12 37	0 13 15	0 13 57	0 14 44	0 15 37	0 16 34	0 17 36	0 18 43	0 19 55
11	0 10 40	0 10 46	0 11 1	0 11 17	0 11 41	0 12 9	0 12 42	0 13 21	0 14 4	0 14 51	0 15 45	0 16 43	0 17 47	0 18 55	0 20 8
12	0 10 42	0 10 47	0 11 3	0 11 19	0 11 44	0 12 13	0 12 47	0 13 27	0 14 11	0 14 59	0 15 54	0 16 53	0 17 58	0 19 8	0 20 22
13	0 10 44	0 10 49	0 11 5	0 11 21	0 11 47	0 12 17	0 12 52	0 13 33	0 14 18	0 15 7	0 16 3	0 17 4	0 18 10	0 19 22	0 20 37
14	0 10 46	0 10 51	0 11 7	0 11 24	0 11 50	0 12 21	0 12 57	0 13 39	0 14 25	0 15 15	0 16 13	0 17 16	0 18 23	0 19 37	0 20 53
15	0 10 48	0 10 53	0 11 9	0 11 27	0 11 53	0 12 25	0 13 2	0 13 45	0 14 32	0 15 24	0 16 24	0 17 28	0 18 37	0 19 53	0 21 11
16	0 10 49	0 10 55	0 11 11	0 11 30	0 11 56	0 12 29	0 13 7	0 13 51	0 14 40	0 15 33	0 16 35	0 17 41	0 18 52	0 20 10	0 21 30
17	0 10 50	0 10 57	0 11 13	0 11 33	0 11 59	0 12 33	0 13 12	0 13 57	0 14 48	0 15 43	0 16 47	0 17 55	0 19 8	0 20 28	0 21 51
18	0 10 51	0 10 59	0 11 15	0 11 36	0 12 3	0 12 37	0 13 18	0 14 4	0 14 56	0 15 53	0 16 59	0 18 9	0 19 25	0 20 47	0 22 13
19	0 10 52	0 11 1	0 11 17	0 11 39	0 12 7	0 12 42	0 13 24	0 14 11	0 15 5	0 16 4	0 17 12	0 18 24	0 19 42	0 21 6	0 22 36
20	0 10 53	0 11 3	0 11 19	0 11 42	0 12 11	0 12 47	0 13 30	0 14 18	0 15 14	0 16 16	0 17 25	0 18 40	0 20 0	0 21 27	0 23 1
21	0 10 54	0 11 5	0 11 21	0 11 45	0 12 15	0 12 52	0 13 36	0 14 26	0 15 24	0 16 28	0 17 39	0 18 57	0 20 19	0 21 49	0 23 27
22	0 10 55	0 11 6	0 11 23	0 11 48	0 12 19	0 12 57	0 13 43	0 14 35	0 15 35	0 16 41	0 17 54	0 19 14	0 20 40	0 22 13	0 23 54
23	0 10 56	0 11 7	0 11 25	0 11 51	0 12 23	0 13 3	0 13 50	0 14 45	0 15 47	0 16 55	0 18 10	0 19 32	0 21 2	0 22 39	0 24 23

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 21	0 10 27	0 10 37	0 10 51	0 11 9	0 11 32	0 11 59	0 12 29	0 13 3	0 13 42	0 14 25	0 15 11	0 16 2	0 16 57	0 17 56
1	0 10 19	0 10 25	0 10 35	0 10 48	0 11 6	0 11 29	0 11 54	0 12 24	0 12 58	0 13 36	0 14 18	0 15 4	0 15 54	0 16 48	0 17 46
2	0 10 17	0 10 23	0 10 33	0 10 45	0 11 3	0 11 26	0 11 50	0 12 19	0 12 53	0 13 30	0 14 11	0 14 57	0 15 46	0 16 39	0 17 36
3	0 10 15	0 10 21	0 10 30	0 10 42	0 11 0	0 11 23	0 11 46	0 12 14	0 12 48	0 13 24	0 14 4	0 14 50	0 15 38	0 16 30	0 17 26
4	0 10 13	0 10 18	0 10 27	0 10 39	0 10 57	0 11 19	0 11 42	0 12 9	0 12 43	0 13 18	0 13 57	0 14 43	0 15 30	0 16 21	0 17 16
5	0 10 10	0 10 15	0 10 24	0 10 36	0 10 54	0 11 15	0 11 38	0 12 4	0 12 38	0 13 12	0 13 51	0 14 36	0 15 22	0 16 12	0 17 6
6	0 10 7	0 10 12	0 10 21	0 10 33	0 10 51	0 11 11	0 11 34	0 11 59	0 12 33	0 13 6	0 13 45	0 14 29	0 15 14	0 16 3	0 16 56
7	0 10 4	0 10 9	0 10 18	0 10 30	0 10 48	0 11 7	0 11 30	0 11 55	0 12 28	0 13 0	0 13 39	0 14 22	0 15 6	0 15 54	0 16 47
8	0 10 1	0 10 6	0 10 15	0 10 27	0 10 44	0 11 3	0 11 26	0 11 51	0 12 23	0 12 55	0 13 33	0 14 15	0 14 58	0 15 46	0 16 38
9	0 9 58	0 10 3	0 10 12	0 10 24	0 10 40	0 10 59	0 11 22	0 11 47	0 12 18	0 12 50	0 13 27	0 14 8	0 14 51	0 15 38	0 16 29
10	0 9 55	0 10 0	0 10 9	0 10 21	0 10 36	0 10 55	0 11 18	0 11 43	0 12 13	0 12 45	0 13 21	0 14 1	0 14 44	0 15 30	0 16 20
11	0 9 52	0 9 57	0 10 6	0 10 18	0 10 32	0 10 51	0 11 14	0 11 38	0 12 8	0 12 39	0 13 15	0 13 54	0 14 37	0 15 22	0 16 11
12	0 9 49	0 9 54	0 10 3	0 10 15	0 10 28	0 10 47	0 11 10	0 11 33	0 12 3	0 12 33	0 13 9	0 13 47	0 14 30	0 15 14	0 16 2
13	0 9 46	0 9 51	0 10 0	0 10 11	0 10 24	0 10 43	0 11 5	0 11 28	0 11 58	0 12 27	0 13 3	0 13 40	0 14 23	0 15 6	0 15 53
14	0 9 43	0 9 47	0 9 57	0 10 7	0 10 20	0 10 39	0 11 0	0 11 23	0 11 53	0 12 21	0 12 57	0 13 33	0 14 15	0 14 58	0 15 44
15	0 9 39	0 9 43	0 9 53	0 10 3	0 10 16	0 10 35	0 10 55	0 11 18	0 11 47	0 12 15	0 12 51	0 13 26	0 14 7	0 14 50	0 15 35
16	0 9 35	0 9 39	0 9 49	0 9 59	0 10 12	0 10 31	0 10 50	0 11 13	0 11 41	0 12 9	0 12 44	0 13 19	0 13 59	0 14 42	0 15 26
17	0 9 31	0 9 35	0 9 45	0 9 55	0 10 8	0 10 26	0 10 45	0 11 8	0 11 35	0 12 3	0 12 37	0 13 12	0 13 51	0 14 34	0 15 17
18	0 9 27	0 9 31	0 9 41	0 9 51	0 10 4	0 10 21	0 10 40	0 11 3	0 11 29	0 11 57	0 12 30	0 13 5	0 13 43	0 14 25	0 15 8
19	0 9 23	0 9 27	0 9 36	0 9 46	0 9 59	0 10 16	0 10 35	0 10 58	0 11 23	0 11 51	0 12 23	0 12 58	0 13 35	0 14 16	0 14 59
20	0 9 19	0 9 23	0 9 31	0 9 41	0 9 54	0 10 11	0 10 30	0 10 52	0 11 17	0 11 45	0 12 16	0 12 50	0 13 27	0 14 7	0 14 49
21	0 9 14	0 9 18	0 9 25	0 9 35	0 9 48	0 10 5	0 10 24	0 10 45	0 11 10	0 11 38	0 12 8	0 12 42	0 13 18	0 13 57	0 14 39
22	0 9 8	0 9 12	0 9 19	0 9 29	0 9 42	0 9 58	0 10 17	0 10 38	0 11 2	0 11 30	0 11 59	0 12 33	0 13 8	0 13 47	0 14 28
23	0 9 1	0 9 5	0 9 12	0 9 22	0 9 35	0 9 50	0 10 9	0 10 30	0 10 54	0 11 21	0 11 50	0 12 23	0 12 58	0 13 36	0 14 17

LATITUDE 44° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 18 59	0 20 5	0 21 16	0 22 31	0 23 50	0 25 13	0 26 40	0 28 11	0 29 45	0 31 24	0 33 7	0 34 54	0 36 45	0 38 39	0 40 38
1	0 19 11	0 20 18	0 21 30	0 22 46	0 24 7	0 25 31	0 27 0	0 28 33	0 30 9	0 31 50	0 33 35	0 35 24	0 37 15	0 39 11	0 41 13
2	0 19 23	0 20 31	0 21 44	0 23 1	0 24 24	0 25 50	0 27 21	0 28 56	0 30 34	0 32 17	0 34 3	0 35 54	0 37 46	0 39 44	0 41 49
3	0 19 36	0 20 45	0 21 59	0 23 17	0 24 42	0 26 10	0 27 43	0 29 20	0 31 0	0 32 44	0 34 32	0 36 25	0 38 18	0 40 18	0 42 26
4	0 19 49	0 20 59	0 22 15	0 23 34	0 25 1	0 26 31	0 28 6	0 29 44	0 31 26	0 33 12	0 35 2	0 36 56	0 38 51	0 40 53	0 43 4
5	0 20 2	0 21 14	0 22 31	0 23 52	0 25 21	0 26 53	0 28 29	0 30 9	0 31 53	0 33 41	0 35 32	0 37 28	0 39 25	0 41 30	0 43 44
6	0 20 15	0 21 29	0 22 48	0 24 11	0 25 42	0 27 15	0 28 53	0 30 35	0 32 21	0 34 10	0 36 3	0 38 1	0 40 1	0 42 9	0 44 26
7	0 20 29	0 21 45	0 23 6	0 24 31	0 26 3	0 27 37	0 29 17	0 31 1	0 32 49	0 34 40	0 36 36	0 38 36	0 40 39	0 42 50	0 45 9
8	0 20 43	0 22 1	0 23 24	0 24 51	0 26 24	0 28 0	0 29 42	0 31 28	0 33 18	0 35 12	0 37 11	0 39 13	0 41 20	0 43 33	0 45 55
9	0 20 57	0 22 17	0 23 42	0 25 11	0 26 46	0 28 24	0 30 8	0 31 56	0 33 49	0 35 46	0 37 48	0 39 53	0 42 4	0 44 19	0 46 43
10	0 21 12	0 22 34	0 24 1	0 25 32	0 27 8	0 28 49	0 30 35	0 32 26	0 34 22	0 36 22	0 38 27	0 40 36	0 42 50	0 45 9	0 47 33
11	0 21 27	0 22 51	0 24 20	0 25 53	0 27 31	0 29 15	0 31 4	0 32 58	0 34 57	0 37 0	0 39 9	0 41 21	0 43 39	0 46 2	0 48 26
12	0 21 43	0 23 9	0 24 40	0 26 15	0 27 56	0 29 43	0 31 35	0 33 32	0 35 34	0 37 40	0 39 53	0 42 9	0 44 30	0 46 57	0 49 22
13	0 22 0	0 23 28	0 25 1	0 26 39	0 28 23	0 30 13	0 32 8	0 34 8	0 36 13	0 38 23	0 40 39	0 42 59	0 45 23	0 47 54	0 50 21
14	0 22 18	0 23 48	0 25 24	0 27 5	0 28 52	0 30 45	0 32 43	0 34 46	0 36 54	0 39 8	0 41 27	0 43 51	0 46 18	0 48 53	0 51 23
15	0 22 38	0 24 10	0 25 49	0 27 33	0 29 23	0 31 19	0 33 20	0 35 26	0 37 37	0 39 55	0 42 17	0 44 45	0 47 15	0 49 54	0 52 27
16	0 22 59	0 24 34	0 26 16	0 28 3	0 29 56	0 31 55	0 33 59	0 36 8	0 38 22	0 40 43	0 43 9	0 45 41	0 48 14	0 50 57	0 53 35
17	0 23 22	0 25 0	0 26 45	0 28 35	0 30 31	0 32 33	0 34 40	0 36 52	0 39 9	0 41 33	0 44 3	0 46 39	0 49 16	0 52 3	0 54 48
18	0 23 47	0 25 28	0 27 15	0 29 8	0 31 7	0 33 12	0 35 23	0 37 38	0 39 58	0 42 26	0 45 0	0 47 40	0 50 22	0 53 13	0 56 6
19	0 24 13	0 25 57	0 27 47	0 29 43	0 31 45	0 33 53	0 36 7	0 38 26	0 40 51	0 43 23	0 46 1	0 48 45	0 51 33	0 54 29	0 57 29
20	0 24 41	0 26 28	0 28 21	0 30 21	0 32 26	0 34 37	0 36 54	0 39 18	0 41 48	0 44 25	0 47 8	0 49 56	0 52 50	0 55 51	0 58 58
21	0 25 10	0 27 0	0 28 57	0 31 1	0 33 10	0 35 25	0 37 46	0 40 15	0 42 50	0 45 32	0 48 20	0 51 14	0 54 14	0 57 21	1 0 34
22	0 25 41	0 27 35	0 29 36	0 31 44	0 33 58	0 36 18	0 38 43	0 41 18	0 43 58	0 46 46	0 49 39	0 52 39	0 55 45	0 58 58	1 2 18
23	0 26 15	0 28 13	0 30 19	0 32 31	0 34 49	0 37 15	0 39 47	0 42 27	0 45 14	0 48 7	0 51 6	0 54 12	0 57 25	1 0 44	1 4 10

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 18 59	0 20 5	0 21 16	0 22 31	0 23 50	0 25 13	0 26 40	0 28 11	0 29 45	0 31 24	0 33 7	0 34 54	0 36 45	0 38 39	0 40 38
1	0 18 48	0 19 53	0 21 3	0 22 17	0 23 34	0 24 56	0 26 21	0 27 50	0 29 22	0 30 59	0 32 40	0 34 26	0 36 15	0 38 7	0 40 4
2	0 18 37	0 19 41	0 20 50	0 22 3	0 23 18	0 24 39	0 26 2	0 27 29	0 29 0	0 30 35	0 32 14	0 33 58	0 35 46	0 37 36	0 39 31
3	0 18 26	0 19 29	0 20 37	0 21 49	0 23 3	0 24 22	0 25 44	0 27 9	0 28 38	0 30 12	0 31 49	0 33 31	0 35 17	0 37 5	0 38 59
4	0 18 15	0 19 17	0 20 24	0 21 35	0 22 48	0 24 5	0 25 26	0 26 50	0 28 17	0 29 49	0 31 25	0 33 5	0 34 49	0 36 35	0 38 27
5	0 18 4	0 19 5	0 20 11	0 21 21	0 22 33	0 23 49	0 25 8	0 26 31	0 27 56	0 29 27	0 31 1	0 32 39	0 34 22	0 36 6	0 37 56
6	0 17 53	0 18 54	0 19 58	0 21 7	0 22 18	0 23 33	0 24 50	0 26 12	0 27 36	0 29 6	0 30 38	0 32 14	0 33 56	0 35 38	0 37 26
7	0 17 43	0 18 43	0 19 46	0 20 53	0 22 3	0 23 17	0 24 33	0 25 54	0 27 17	0 28 45	0 30 16	0 31 50	0 33 31	0 35 11	0 36 57
8	0 17 33	0 18 32	0 19 34	0 20 39	0 21 48	0 23 1	0 24 16	0 25 36	0 26 58	0 28 25	0 29 55	0 31 27	0 33 6	0 34 45	0 36 29
9	0 17 23	0 18 21	0 19 22	0 20 26	0 21 34	0 22 46	0 24 0	0 25 19	0 26 40	0 28 5	0 29 34	0 31 5	0 32 42	0 34 20	0 36 2
10	0 17 13	0 18 10	0 19 10	0 20 13	0 21 20	0 22 31	0 23 44	0 25 2	0 26 22	0 27 46	0 29 14	0 30 44	0 32 19	0 33 56	0 35 36
11	0 17 4	0 18 0	0 18 59	0 20 1	0 21 7	0 22 17	0 23 29	0 24 46	0 26 5	0 27 28	0 28 54	0 30 22	0 31 56	0 33 32	0 35 10
12	0 16 55	0 17 50	0 18 48	0 19 49	0 20 54	0 22 3	0 23 14	0 24 30	0 25 48	0 27 10	0 28 34	0 30 0	0 31 33	0 33 8	0 34 44
13	0 16 45	0 17 40	0 18 37	0 19 37	0 20 41	0 21 49	0 22 59	0 24 14	0 25 31	0 26 52	0 28 14	0 29 39	0 31 10	0 32 44	0 34 19
14	0 16 35	0 17 30	0 18 26	0 19 25	0 20 28	0 21 35	0 22 44	0 23 58	0 25 14	0 26 33	0 27 54	0 29 18	0 30 47	0 32 20	0 33 54
15	0 16 25	0 17 19	0 18 15	0 19 13	0 20 15	0 21 21	0 22 29	0 23 42	0 24 57	0 26 14	0 27 34	0 28 57	0 30 24	0 31 56	0 33 29
16	0 16 15	0 17 8	0 18 3	0 19 1	0 20 2	0 21 7	0 22 14	0 23 26	0 24 39	0 25 55	0 27 14	0 28 36	0 30 1	0 31 32	0 33 4
17	0 16 5	0 16 57	0 17 51	0 18 49	0 19 49	0 20 53	0 21 59	0 23 9	0 24 21	0 25 36	0 26 54	0 28 15	0 29 39	0 31 8	0 32 39
18	0 15 55	0 16 46	0 17 39	0 18 36	0 19 35	0 20 38	0 21 43	0 22 52	0 24 3	0 25 17	0 26 34	0 27 54	0 29 17	0 30 44	0 32 14
19	0 15 45	0 16 35	0 17 27	0 18 23	0 19 21	0 20 23	0 21 27	0 22 35	0 23 45	0 24 58	0 26 14	0 27 33	0 28 55	0 30 20	0 31 49
20	0 15 35	0 16 24	0 17 15	0 18 10	0 19 7	0 20 8	0 21 11	0 22 18	0 23 27	0 24 39	0 25 54	0 27 12	0 28 33	0 29 57	0 31 24
21	0 15 24	0 16 12	0 17 3	0 17 57	0 18 53	0 19 53	0 20 55	0 22 1	0 23 9	0 24 20	0 25 34	0 26 51	0 28 11	0 29 34	0 30 59
22	0 15 13	0 16 0	0 16 50	0 17 43	0 18 39	0 19 38	0 20 39	0 21 44	0 22 51	0 24 1	0 25 14	0 26 30	0 27 49	0 29 10	0 30 34
23	0 15 1	0 15 48	0 16 37	0 17 29	0 18 24	0 19 22	0 20 23	0 21 26	0 22 32	0 23 41	0 24 53	0 26 8	0 27 26	0 28 46	0 30 9

LATITUDE 44° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 42 40	0 44 47	0 46 57	0 49 11	0 51 29	0 53 51	0 56 17	0 58 47	1 1 21	1 3 58	1 6 39	1 9 24	1 12 12	1 15 7	1 18 1
1	0 43 17	0 45 26	0 47 39	0 49 56	0 52 17	0 54 42	0 57 11	0 59 44	1 2 21	1 4 59	1 7 42	1 10 30	1 13 21	1 16 19	1 19 17
2	0 43 55	0 46 6	0 48 22	0 50 42	0 53 6	0 55 34	0 58 6	1 0 42	1 3 22	1 6 1	1 8 47	1 11 38	1 14 32	1 17 32	1 20 34
3	0 44 35	0 46 48	0 49 6	0 51 29	0 53 56	0 56 27	0 59 2	1 1 41	1 4 24	1 7 3	1 9 52	1 12 46	1 15 44	1 18 46	1 21 52
4	0 45 16	0 47 32	0 49 52	0 52 17	0 54 47	0 57 21	1 0 0	1 2 42	1 5 28	1 8 9	1 11 1	1 13 58	1 17 0	1 20 5	1 23 15
5	0 45 58	0 48 17	0 50 40	0 53 7	0 55 40	0 58 17	1 0 59	1 3 45	1 6 34	1 9 19	1 12 15	1 15 15	1 18 20	1 21 29	1 24 42
6	0 46 42	0 49 4	0 51 30	0 53 59	0 56 35	0 59 15	1 2 0	1 4 49	1 7 42	1 10 32	1 13 31	1 16 35	1 19 43	1 22 56	1 26 12
7	0 47 29	0 49 53	0 52 22	0 54 54	0 57 33	1 0 16	1 3 4	1 5 56	1 8 52	1 11 47	1 14 49	1 17 57	1 21 9	1 24 26	1 27 45
8	0 48 18	0 50 45	0 53 17	0 55 52	0 58 34	1 1 20	1 4 11	1 7 6	1 10 5	1 13 3	1 16 10	1 19 21	1 22 37	1 25 58	1 29 22
9	0 49 9	0 51 40	0 54 15	0 56 53	0 59 38	1 2 28	1 5 22	1 8 20	1 11 22	1 14 25	1 17 36	1 20 51	1 24 10	1 27 35	1 31 3
10	0 50 3	0 52 38	0 55 16	0 57 58	1 0 46	1 3 40	1 6 37	1 9 38	1 12 43	1 15 53	1 19 8	1 22 27	1 25 50	1 29 17	1 32 50
11	0 51 0	0 53 39	0 56 21	0 59 7	1 1 58	1 4 55	1 7 55	1 11 0	1 14 9	1 17 23	1 20 42	1 24 6	1 27 34	1 31 6	1 34 42
12	0 52 0	0 54 43	0 57 29	1 0 19	1 3 13	1 6 14	1 9 17	1 12 26	1 15 39	1 18 56	1 22 19	1 25 48	1 29 21	1 32 58	1 36 38
13	0 53 3	0 55 50	0 58 40	1 1 34	1 4 32	1 7 37	1 10 43	1 13 57	1 17 14	1 20 32	1 24 0	1 27 33	1 31 11	1 34 54	1 38 40
14	0 54 9	0 57 0	0 59 54	1 2 52	1 5 55	1 9 4	1 12 13	1 15 32	1 18 53	1 22 17	1 25 50	1 29 25	1 33 8	1 36 56	1 40 50
15	0 55 18	0 58 13	1 1 11	1 4 14	1 7 22	1 10 35	1 13 48	1 17 11	1 20 37	1 24 8	1 27 46	1 31 25	1 35 13	1 39 6	1 43 9
16	0 56 30	0 59 30	1 2 32	1 5 40	1 8 53	1 12 10	1 15 27	1 18 54	1 22 26	1 26 6	1 29 49	1 33 33	1 37 27	1 41 25	1 45 34
17	0 57 47	1 0 51	1 3 58	1 7 10	1 10 28	1 13 50	1 17 11	1 20 43	1 24 21	1 28 11	1 31 59	1 35 51	1 39 51	1 43 55	1 48 8
18	0 59 9	1 2 17	1 5 29	1 8 46	1 12 9	1 15 36	1 19 3	1 22 40	1 26 24	1 30 23	1 34 19	1 38 19	1 42 25	1 46 35	1 50 51
19	1 0 36	1 3 49	1 7 6	1 10 29	1 13 57	1 17 29	1 21 4	1 24 47	1 28 37	1 32 45	1 36 46	1 40 55	1 45 8	1 49 25	1 53 47
20	1 2 10	1 5 28	1 8 51	1 12 20	1 15 54	1 19 32	1 23 16	1 27 5	1 31 2	1 35 17	1 39 24	1 43 41	1 48 2	1 52 26	1 56 56
21	1 3 52	1 7 16	1 10 45	1 14 21	1 18 1	1 21 47	1 25 39	1 29 36	1 33 40	1 38 1	1 42 15	1 46 39	1 51 7	1 55 40	2 0 18
22	1 5 42	1 9 12	1 12 48	1 16 32	1 20 20	1 24 14	1 28 14	1 32 20	1 36 32	1 40 57	1 45 20	1 49 51	1 54 26	1 59 8	2 3 55
23	1 7 41	1 11 18	1 15 2	1 18 54	1 22 51	1 26 54	1 31 3	1 35 18	1 39 39	1 44 6	1 48 39	1 53 17	1 58 1	2 2 52	2 7 47

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 42 40	0 44 47	0 46 57	0 49 11	0 51 29	0 53 51	0 56 17	0 58 47	1 1 21	1 3 58	1 6 39	1 9 24	1 12 12	1 15 7	1 18 1
1	0 42 5	0 44 10	0 46 18	0 48 29	0 50 44	0 53 4	0 55 27	0 57 53	1 0 24	1 2 58	1 5 36	1 8 18	1 11 3	1 13 55	1 16 46
2	0 41 30	0 43 33	0 45 39	0 47 48	0 50 0	0 52 18	0 54 38	0 57 1	0 59 30	1 2 1	1 4 36	1 7 15	1 9 57	1 12 46	1 15 34
3	0 40 56	0 42 57	0 45 1	0 47 8	0 49 17	0 51 33	0 53 50	0 56 11	0 58 38	1 1 7	1 3 39	1 6 15	1 8 54	1 11 40	1 14 25
4	0 40 23	0 42 22	0 44 24	0 46 29	0 48 35	0 50 49	0 53 4	0 55 23	0 57 47	1 0 14	1 2 44	1 5 17	1 7 54	1 10 37	1 13 19
5	0 39 50	0 41 47	0 43 47	0 45 50	0 47 55	0 50 7	0 52 19	0 54 36	0 56 57	0 59 22	1 1 50	1 4 21	1 6 56	1 9 36	1 12 16
6	0 39 18	0 41 13	0 43 11	0 45 12	0 47 16	0 49 25	0 51 36	0 53 50	0 56 9	0 58 32	1 0 58	1 3 26	1 5 59	1 8 37	1 11 15
7	0 38 47	0 40 40	0 42 36	0 44 35	0 46 38	0 48 45	0 50 54	0 53 6	0 55 23	0 57 44	1 0 7	1 2 33	1 5 4	1 7 40	1 10 16
8	0 38 17	0 40 8	0 42 2	0 43 59	0 46 1	0 48 6	0 50 13	0 52 23	0 54 38	0 56 57	0 59 18	1 1 42	1 4 10	1 6 44	1 9 18
9	0 37 48	0 39 37	0 41 29	0 43 24	0 45 25	0 47 28	0 49 33	0 51 41	0 53 54	0 56 11	0 58 30	1 0 52	1 3 18	1 5 49	1 8 21
10	0 37 20	0 39 7	0 40 57	0 42 51	0 44 50	0 46 51	0 48 54	0 51 0	0 53 11	0 55 26	0 57 43	1 0 3	1 2 27	1 4 55	1 7 25
11	0 36 53	0 38 38	0 40 26	0 42 19	0 44 16	0 46 15	0 48 16	0 50 20	0 52 29	0 54 42	0 56 57	0 59 15	1 1 37	1 4 2	1 6 30
12	0 36 26	0 38 10	0 39 56	0 41 48	0 43 42	0 45 39	0 47 39	0 49 41	0 51 48	0 53 59	0 56 12	0 58 28	1 0 48	1 3 10	1 5 36
13	0 35 59	0 37 42	0 39 26	0 41 17	0 43 9	0 45 4	0 47 2	0 49 3	0 51 8	0 53 17	0 55 28	0 57 42	1 0 0	1 2 19	1 4 43
14	0 35 32	0 37 14	0 38 56	0 40 46	0 42 36	0 44 30	0 46 26	0 48 25	0 50 29	0 52 35	0 54 44	0 56 56	0 59 12	1 1 29	1 3 51
15	0 35 5	0 36 46	0 38 27	0 40 15	0 42 3	0 43 56	0 45 50	0 47 48	0 49 50	0 51 54	0 54 1	0 56 11	0 58 25	1 0 40	1 3 0
16	0 34 38	0 36 18	0 37 58	0 39 44	0 41 30	0 43 22	0 45 14	0 47 11	0 49 11	0 51 13	0 53 18	0 55 26	0 57 38	0 59 51	1 2 9
17	0 34 12	0 35 50	0 37 29	0 39 13	0 40 58	0 42 48	0 44 38	0 46 34	0 48 32	0 50 32	0 52 35	0 54 41	0 56 51	0 59 2	1 1 18
18	0 33 46	0 35 22	0 37 0	0 38 42	0 40 26	0 42 14	0 44 3	0 45 57	0 47 53	0 49 51	0 51 52	0 53 56	0 56 4	0 58 14	1 0 28
19	0 33 20	0 34 54	0 36 31	0 38 11	0 39 54	0 41 40	0 43 28	0 45 20	0 47 14	0 49 10	0 51 10	0 53 12	0 55 18	0 57 26	0 59 38
20	0 32 54	0 34 26	0 36 2	0 37 40	0 39 22	0 41 6	0 42 53	0 44 43	0 46 35	0 48 30	0 50 28	0 52 28	0 54 32	0 56 39	0 58 49
21	0 32 28	0 33 58	0 35 33	0 37 9	0 38 50	0 40 32	0 42 18	0 44 6	0 45 56	0 47 50	0 49 46	0 51 44	0 53 47	0 55 52	0 58 0
22	0 32 2	0 33 31	0 35 4	0 36 39	0 38 18	0 39 59	0 41 43	0 43 29	0 45 18	0 47 10	0 49 4	0 51 1	0 53 2	0 55 5	0 57 11
23	0 31 35	0 33 4	0 34 35	0 36 9	0 37 47	0 39 26	0 41 8	0 42 53	0 44 40	0 46 30	0 48 23	0 50 18	0 52 17	0 54 18	0 56 23

LATITUDE 44° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 21 2	1 24 6	1 27 14	1 30 25	1 33 40	1 36 58	1 40 21	1 43 47	1 47 16	1 50 50	1 54 27	1 58 7	2 1 51	2 5 39	2 9 30
1	1 22 21	1 25 28	1 28 39	1 31 53	1 35 11	1 38 32	1 41 58	1 45 28	1 49 1	1 52 37	1 56 18	2 0 2	2 3 50	2 7 42	2 11 37
2	1 23 41	1 26 52	1 30 6	1 33 23	1 36 44	1 40 9	1 43 39	1 47 12	1 50 49	1 54 28	1 58 13	2 2 1	2 5 53	2 9 49	2 13 48
3	1 25 3	1 28 17	1 31 34	1 34 55	1 38 20	1 41 49	1 45 23	1 49 0	1 52 40	1 56 24	2 0 12	2 4 4	2 8 1	2 12 1	2 16 3
4	1 26 29	1 29 46	1 33 8	1 36 31	1 40 0	1 43 33	1 47 11	1 50 52	1 54 36	1 58 24	2 2 16	2 6 12	2 10 13	2 14 17	2 18 23
5	1 27 59	1 31 20	1 34 44	1 38 13	1 41 46	1 45 23	1 49 3	1 52 48	1 56 37	2 0 30	2 4 26	2 8 26	2 12 30	2 16 38	2 20 49
6	1 29 32	1 32 57	1 36 26	1 39 59	1 43 36	1 47 17	1 51 1	1 54 50	1 58 43	2 2 40	2 6 40	2 10 44	2 14 52	2 19 4	2 23 19
7	1 31 9	1 34 38	1 38 11	1 41 48	1 45 29	1 49 14	1 53 3	1 56 56	2 0 53	2 4 54	2 8 59	2 13 8	2 17 20	2 21 36	2 25 56
8	1 32 50	1 36 23	1 40 0	1 43 41	1 47 26	1 51 15	1 55 8	1 59 6	2 3 8	2 7 13	2 11 23	2 15 37	2 19 55	2 24 16	2 28 41
9	1 34 35	1 38 13	1 41 55	1 45 40	1 49 29	1 53 22	1 57 20	2 1 23	2 5 30	2 9 40	2 13 55	2 18 14	2 22 37	2 27 4	2 31 35
10	1 36 28	1 40 10	1 43 56	1 47 46	1 51 39	1 55 37	1 59 40	2 3 48	2 8 0	2 12 15	2 16 35	2 20 59	2 25 27	2 30 0	2 34 37
11	1 38 24	1 42 10	1 46 1	1 49 56	1 53 54	1 57 58	2 2 6	2 6 19	2 10 36	2 14 56	2 19 21	2 23 50	2 28 23	2 33 1	2 37 43
12	1 40 25	1 44 16	1 48 12	1 52 12	1 56 15	2 0 25	2 4 38	2 8 56	2 13 18	2 17 44	2 22 14	2 26 48	2 31 27	2 36 10	2 40 57
13	1 42 31	1 46 27	1 50 29	1 54 35	1 58 44	2 2 58	2 7 16	2 11 39	2 16 8	2 20 40	2 25 15	2 29 55	2 34 40	2 39 29	2 44 21
14	1 44 46	1 48 47	1 52 55	1 57 7	2 1 22	2 5 41	2 10 5	2 14 33	2 19 8	2 23 46	2 28 28	2 33 14	2 38 4	2 43 0	2 47 59
15	1 47 12	1 51 18	1 55 31	1 59 48	2 4 9	2 8 35	2 13 6	2 17 39	2 22 20	2 27 4	2 31 53	2 36 45	2 41 41	2 46 44	2 51 50
16	1 49 44	1 53 57	1 58 15	2 2 38	2 7 5	2 11 38	2 16 16	2 20 56	2 25 42	2 30 33	2 35 28	2 40 27	2 45 30	2 50 39	2 55 52
17	1 52 24	1 56 44	2 1 8	2 5 38	2 10 11	2 14 50	2 19 35	2 24 23	2 29 16	2 34 13	2 39 15	2 44 21	2 49 32	2 54 47	3 0 7
18	1 55 13	1 59 40	2 4 12	2 8 48	2 13 28	2 18 13	2 23 4	2 28 0	2 33 1	2 38 5	2 43 14	2 48 28	2 53 47	2 59 9	3 4 36
19	1 58 16	2 2 50	2 7 29	2 12 12	2 16 59	2 21 51	2 26 50	2 31 53	2 37 2	2 42 14	2 47 31	2 52 53	2 58 19	3 3 49	3 9 24
20	2 1 33	2 6 14	2 10 59	2 15 49	2 20 40	2 25 46	2 30 53	2 36 4	2 41 20	2 46 41	2 52 6	2 57 36	3 3 10	3 8 49	3 14 33
21	2 5 3	2 9 52	2 14 45	2 19 43	2 24 46	2 29 58	2 35 13	2 40 33	2 45 56	2 51 26	2 57 0	3 2 39	3 8 21	3 14 9	3 20 2
22	2 8 47	2 13 44	2 18 47	2 23 56	2 29 6	2 34 26	2 39 50	2 45 19	2 50 51	2 56 30	3 2 14	3 8 2	3 13 53	3 19 50	3 25 52
23	2 12 46	2 17 52	2 23 5	2 28 28	2 33 45	2 39 12	2 44 45	2 50 23	2 56 6	3 1 54	3 7 48	3 13 45	3 19 46	3 25 52	3 32 4

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 21 2	1 24 6	1 27 14	1 30 25	1 33 40	1 36 58	1 40 21	1 43 47	1 47 16	1 50 50	1 54 27	1 58 7	2 1 51	2 5 39	2 9 30
1	1 19 44	1 22 46	1 25 51	1 28 59	1 32 11	1 35 26	1 38 47	1 42 10	1 45 35	1 49 5	1 52 39	1 56 15	1 59 57	2 3 41	2 7 28
2	1 18 29	1 21 29	1 24 31	1 27 36	1 30 45	1 33 58	1 37 16	1 40 36	1 43 58	1 47 24	1 50 55	1 54 28	1 58 6	2 1 46	2 5 30
3	1 17 17	1 20 15	1 23 14	1 26 16	1 29 22	1 32 33	1 35 48	1 39 5	1 42 24	1 45 47	1 49 14	1 52 44	1 56 18	1 59 55	2 3 36
4	1 16 8	1 19 4	1 22 0	1 24 59	1 28 2	1 31 10	1 34 22	1 37 36	1 40 52	1 44 12	1 47 36	1 51 3	1 54 33	1 58 7	2 1 45
5	1 15 2	1 17 55	1 20 48	1 23 44	1 26 44	1 29 49	1 32 58	1 36 9	1 39 22	1 42 39	1 46 0	1 49 24	1 52 51	1 56 22	1 59 56
6	1 13 58	1 16 48	1 19 38	1 22 31	1 25 28	1 28 30	1 31 36	1 34 44	1 37 54	1 41 8	1 44 26	1 47 47	1 51 11	1 54 39	1 58 10
7	1 12 56	1 15 43	1 18 30	1 21 20	1 24 14	1 27 13	1 30 16	1 33 21	1 36 28	1 39 39	1 42 54	1 46 12	1 49 33	1 52 58	1 56 26
8	1 11 55	1 14 39	1 17 23	1 20 11	1 23 2	1 25 58	1 28 58	1 32 0	1 35 4	1 38 12	1 41 24	1 44 39	1 47 57	1 51 19	1 54 44
9	1 10 56	1 13 36	1 16 18	1 19 4	1 21 52	1 24 45	1 27 42	1 30 41	1 33 42	1 36 47	1 39 56	1 43 8	1 46 23	1 49 42	1 53 4
10	1 9 58	1 12 35	1 15 15	1 17 58	1 20 44	1 23 34	1 26 28	1 29 24	1 32 22	1 35 24	1 38 30	1 41 39	1 44 51	1 48 7	1 51 26
11	1 9 1	1 11 35	1 14 13	1 16 53	1 19 37	1 22 25	1 25 16	1 28 9	1 31 4	1 34 3	1 37 6	1 40 12	1 43 21	1 46 34	1 49 50
12	1 8 5	1 10 36	1 13 12	1 15 50	1 18 31	1 21 17	1 24 5	1 26 55	1 29 48	1 32 44	1 35 44	1 38 47	1 41 53	1 45 3	1 48 16
13	1 7 10	1 9 38	1 12 12	1 14 48	1 17 26	1 20 10	1 22 55	1 25 42	1 28 33	1 31 27	1 34 24	1 37 24	1 40 27	1 43 34	1 46 44
14	1 6 16	1 8 41	1 11 13	1 13 47	1 16 22	1 19 4	1 21 46	1 24 31	1 27 20	1 30 12	1 33 6	1 36 3	1 39 3	1 42 7	1 45 14
15	1 5 22	1 7 45	1 10 15	1 12 47	1 15 19	1 17 59	1 20 39	1 23 22	1 26 8	1 28 58	1 31 50	1 34 44	1 37 41	1 40 42	1 43 46
16	1 4 29	1 6 50	1 9 18	1 11 48	1 14 17	1 16 55	1 19 33	1 22 14	1 24 57	1 27 45	1 30 35	1 33 27	1 36 21	1 39 19	1 42 20
17	1 3 36	1 5 56	1 8 22	1 10 49	1 13 16	1 15 51	1 18 27	1 21 6	1 23 47	1 26 33	1 29 21	1 32 10	1 35 2	1 37 58	1 40 56
18	1 2 44	1 5 3	1 7 26	1 9 51	1 12 16	1 14 48	1 17 22	1 19 59	1 22 38	1 25 21	1 28 7	1 30 54	1 33 44	1 36 38	1 39 34
19	1 1 52	1 4 10	1 6 30	1 8 53	1 11 17	1 13 46	1 16 18	1 18 53	1 21 30	1 24 10	1 26 54	1 29 39	1 32 27	1 35 18	1 38 12
20	1 1 1	1 3 17	1 5 35	1 7 56	1 10 19	1 12 45	1 15 15	1 17 48	1 20 23	1 23 0	1 25 41	1 28 24	1 31 10	1 33 59	1 36 51
21	1 0 10	1 2 24	1 4 40	1 6 59	1 9 21	1 11 45	1 14 12	1 16 43	1 19 16	1 21 51	1 24 29	1 27 10	1 29 54	1 32 40	1 35 30
22	0 59 20	1 1 32	1 3 46	1 6 3	1 8 23	1 10 45	1 13 10	1 15 38	1 18 9	1 20 42	1 23 18	1 25 57	1 28 38	1 31 22	1 34 10
23	0 58 30	1 0 40	1 2 52	1 5 7	1 7 25	1 9 45	1 12 8	1 14 34	1 17 2	1 19 34	1 22 8	1 24 44	1 27 23	1 30 5	1 32 50

LATITUDE 45° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 21	0 10 27	0 10 36	0 10 50	0 11 8	0 11 30	0 11 55	0 12 24	0 12 58	0 13 35	0 14 16	0 15 1	0 15 50	0 16 43	0 17 40
1	0 10 22	0 10 28	0 10 39	0 10 53	0 11 10	0 11 33	0 11 58	0 12 28	0 13 3	0 13 40	0 14 22	0 15 8	0 15 58	0 16 52	0 17 51
2	0 10 23	0 10 29	0 10 41	0 10 55	0 11 12	0 11 36	0 12 1	0 12 32	0 13 8	0 13 46	0 14 28	0 15 15	0 16 6	0 17 2	0 18 2
3	0 10 24	0 10 31	0 10 43	0 10 58	0 11 14	0 11 39	0 12 4	0 12 36	0 13 13	0 13 52	0 14 35	0 15 22	0 16 15	0 17 12	0 18 13
4	0 10 26	0 10 33	0 10 45	0 11 0	0 11 17	0 11 42	0 12 8	0 12 40	0 13 18	0 13 58	0 14 42	0 15 30	0 16 24	0 17 22	0 18 24
5	0 10 28	0 10 35	0 10 47	0 11 3	0 11 20	0 11 45	0 12 12	0 12 44	0 13 23	0 14 4	0 14 49	0 15 38	0 16 33	0 17 32	0 18 35
6	0 10 30	0 10 37	0 10 49	0 11 5	0 11 23	0 11 48	0 12 16	0 12 48	0 13 28	0 14 10	0 14 56	0 15 46	0 16 42	0 17 42	0 18 46
7	0 10 32	0 10 39	0 10 51	0 11 8	0 11 26	0 11 51	0 12 20	0 12 53	0 13 33	0 14 16	0 15 3	0 15 54	0 16 51	0 17 52	0 18 57
8	0 10 34	0 10 41	0 10 53	0 11 10	0 11 29	0 11 54	0 12 24	0 12 58	0 13 38	0 14 22	0 15 10	0 16 2	0 17 0	0 18 2	0 19 8
9	0 10 36	0 10 43	0 10 55	0 11 12	0 11 32	0 11 57	0 12 28	0 13 3	0 13 43	0 14 28	0 15 17	0 16 10	0 17 9	0 18 12	0 19 19
10	0 10 38	0 10 45	0 10 57	0 11 14	0 11 35	0 12 1	0 12 32	0 13 8	0 13 48	0 14 34	0 15 24	0 16 18	0 17 18	0 18 22	0 19 31
11	0 10 40	0 10 47	0 10 59	0 11 17	0 11 38	0 12 5	0 12 36	0 13 13	0 13 54	0 14 41	0 15 32	0 16 27	0 17 28	0 18 33	0 19 44
12	0 10 42	0 10 49	0 11 1	0 11 19	0 11 41	0 12 9	0 12 41	0 13 18	0 14 0	0 14 48	0 15 40	0 16 36	0 17 39	0 18 45	0 19 58
13	0 10 44	0 10 51	0 11 3	0 11 22	0 11 44	0 12 13	0 12 46	0 13 23	0 14 6	0 14 55	0 15 49	0 16 46	0 17 51	0 18 58	0 20 13
14	0 10 46	0 10 53	0 11 5	0 11 24	0 11 47	0 12 17	0 12 51	0 13 29	0 14 12	0 15 2	0 15 58	0 16 57	0 18 4	0 19 12	0 20 29
15	0 10 48	0 10 55	0 11 7	0 11 27	0 11 50	0 12 21	0 12 56	0 13 35	0 14 19	0 15 10	0 16 7	0 17 8	0 18 17	0 19 27	0 20 45
16	0 10 49	0 10 57	0 11 9	0 11 29	0 11 53	0 12 25	0 13 1	0 13 41	0 14 26	0 15 18	0 16 17	0 17 20	0 18 31	0 19 42	0 21 2
17	0 10 50	0 10 59	0 11 11	0 11 32	0 11 56	0 12 29	0 13 6	0 13 47	0 14 34	0 15 27	0 16 27	0 17 32	0 18 45	0 19 58	0 21 20
18	0 10 51	0 11 0	0 11 13	0 11 34	0 11 59	0 12 33	0 13 11	0 13 53	0 14 42	0 15 37	0 16 38	0 17 45	0 19 0	0 20 15	0 21 39
19	0 10 52	0 11 1	0 11 15	0 11 37	0 12 3	0 12 37	0 13 16	0 14 0	0 14 51	0 15 47	0 16 50	0 17 59	0 19 16	0 20 34	0 22 0
20	0 10 53	0 11 2	0 11 17	0 11 39	0 12 7	0 12 41	0 13 21	0 14 7	0 15 0	0 15 58	0 17 3	0 18 14	0 19 33	0 20 54	0 22 23
21	0 10 54	0 11 3	0 11 19	0 11 41	0 12 10	0 12 45	0 13 27	0 14 15	0 15 9	0 16 10	0 17 17	0 18 30	0 19 51	0 21 15	0 22 47
22	0 10 55	0 11 4	0 11 21	0 11 44	0 12 14	0 12 50	0 13 33	0 14 23	0 15 19	0 16 22	0 17 31	0 18 47	0 20 9	0 21 37	0 23 12
23	0 10 56	0 11 6	0 11 23	0 11 47	0 12 18	0 12 55	0 13 40	0 14 31	0 15 29	0 16 34	0 17 45	0 19 4	0 20 28	0 21 59	0 23 37

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 21	0 10 27	0 10 36	0 10 50	0 11 8	0 11 30	0 11 55	0 12 24	0 12 58	0 13 35	0 14 16	0 15 1	0 15 50	0 16 43	0 17 40
1	0 10 19	0 10 24	0 10 33	0 10 47	0 11 5	0 11 27	0 11 51	0 12 20	0 12 53	0 13 30	0 14 9	0 14 54	0 15 43	0 16 34	0 17 30
2	0 10 16	0 10 21	0 10 30	0 10 44	0 11 2	0 11 23	0 11 47	0 12 16	0 12 48	0 13 25	0 14 2	0 14 47	0 15 36	0 16 25	0 17 20
3	0 10 13	0 10 18	0 10 27	0 10 41	0 10 59	0 11 19	0 11 43	0 12 12	0 12 43	0 13 20	0 13 55	0 14 40	0 15 29	0 16 16	0 17 10
4	0 10 10	0 10 15	0 10 24	0 10 38	0 10 56	0 11 15	0 11 39	0 12 7	0 12 38	0 13 14	0 13 49	0 14 33	0 15 21	0 16 7	0 17 0
5	0 10 7	0 10 12	0 10 21	0 10 35	0 10 52	0 11 11	0 11 35	0 12 2	0 12 33	0 13 8	0 13 43	0 14 26	0 15 13	0 15 58	0 16 51
6	0 10 4	0 10 9	0 10 18	0 10 32	0 10 48	0 11 7	0 11 31	0 11 57	0 12 28	0 13 2	0 13 37	0 14 19	0 15 5	0 15 50	0 16 42
7	0 10 1	0 10 6	0 10 15	0 10 29	0 10 44	0 11 3	0 11 27	0 11 52	0 12 23	0 12 56	0 13 31	0 14 12	0 14 57	0 15 42	0 16 33
8	0 9 58	0 10 3	0 10 12	0 10 25	0 10 40	0 10 59	0 11 22	0 11 47	0 12 18	0 12 50	0 13 25	0 14 5	0 14 49	0 15 34	0 16 24
9	0 9 55	0 10 0	0 10 9	0 10 21	0 10 36	0 10 55	0 11 17	0 11 42	0 12 12	0 12 44	0 13 19	0 13 58	0 14 41	0 15 26	0 16 15
10	0 9 52	0 9 57	0 10 6	0 10 17	0 10 32	0 10 51	0 11 12	0 11 37	0 12 6	0 12 38	0 13 13	0 13 51	0 14 33	0 15 18	0 16 6
11	0 9 48	0 9 53	0 10 2	0 10 13	0 10 28	0 10 47	0 11 7	0 11 32	0 12 0	0 12 32	0 13 7	0 13 44	0 14 25	0 15 10	0 15 57
12	0 9 44	0 9 49	0 9 58	0 10 9	0 10 24	0 10 43	0 11 2	0 11 27	0 11 54	0 12 26	0 13 1	0 13 37	0 14 17	0 15 2	0 15 48
13	0 9 40	0 9 45	0 9 54	0 10 5	0 10 20	0 10 38	0 10 57	0 11 22	0 11 48	0 12 20	0 12 55	0 13 30	0 14 9	0 14 54	0 15 39
14	0 9 36	0 9 41	0 9 50	0 10 1	0 10 16	0 10 33	0 10 52	0 11 17	0 11 42	0 12 14	0 12 48	0 13 23	0 14 1	0 14 45	0 15 30
15	0 9 32	0 9 37	0 9 46	0 9 57	0 10 12	0 10 28	0 10 47	0 11 12	0 11 36	0 12 8	0 12 41	0 13 16	0 13 53	0 14 36	0 15 21
16	0 9 28	0 9 33	0 9 42	0 9 53	0 10 7	0 10 23	0 10 42	0 11 7	0 11 30	0 12 1	0 12 34	0 13 9	0 13 45	0 14 27	0 15 12
17	0 9 24	0 9 29	0 9 37	0 9 49	0 10 2	0 10 18	0 10 37	0 11 1	0 11 24	0 11 54	0 12 27	0 13 1	0 13 37	0 14 18	0 15 3
18	0 9 20	0 9 25	0 9 32	0 9 44	0 9 57	0 10 13	0 10 32	0 10 55	0 11 18	0 11 47	0 12 20	0 12 53	0 13 29	0 14 9	0 14 53
19	0 9 16	0 9 20	0 9 27	0 9 39	0 9 51	0 10 7	0 10 26	0 10 49	0 11 12	0 11 40	0 12 12	0 12 45	0 13 21	0 14 0	0 14 43
20	0 9 11	0 9 15	0 9 22	0 9 33	0 9 45	0 10 1	0 10 20	0 10 42	0 11 6	0 11 33	0 12 4	0 12 37	0 13 13	0 13 51	0 14 33
21	0 9 5	0 9 9	0 9 16	0 9 26	0 9 38	0 9 54	0 10 13	0 10 34	0 10 58	0 11 25	0 11 55	0 12 28	0 13 4	0 13 41	0 14 22
22	0 8 58	0 9 2	0 9 9	0 9 19	0 9 31	0 9 47	0 10 5	0 10 26	0 10 50	0 11 16	0 11 46	0 12 18	0 12 54	0 13 30	0 14 11
23	0 8 51	0 8 55	0 9 2	0 9 12	0 9 24	0 9 39	0 9 57	0 10 18	0 10 41	0 11 7	0 11 36	0 12 8	0 12 43	0 13 19	0 13 59

LATITUDE 45° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 18 40	0 19 45	0 20 54	0 22 6	0 23 17	0 24 42	0 26 6	0 27 34	0 29 6	0 30 41	0 32 21	0 34 2	0 35 51	0 37 41	0 39 36
1	0 18 52	0 19 58	0 21 8	0 22 21	0 23 34	0 25 0	0 26 25	0 27 55	0 29 28	0 31 5	0 32 46	0 34 29	0 36 20	0 38 12	0 40 9
2	0 19 4	0 20 11	0 21 22	0 22 36	0 23 51	0 25 18	0 26 45	0 28 16	0 29 51	0 31 29	0 33 12	0 34 57	0 36 50	0 38 44	0 40 43
3	0 19 16	0 20 24	0 21 37	0 22 52	0 24 9	0 25 37	0 27 5	0 28 38	0 30 14	0 31 54	0 33 39	0 35 26	0 37 21	0 39 17	0 41 18
4	0 19 28	0 20 38	0 21 52	0 23 8	0 24 27	0 25 56	0 27 26	0 29 0	0 30 38	0 32 20	0 34 7	0 35 56	0 37 53	0 39 51	0 41 54
5	0 19 40	0 20 52	0 22 7	0 23 25	0 24 46	0 26 16	0 27 48	0 29 23	0 31 3	0 32 47	0 34 36	0 36 27	0 38 26	0 40 26	0 42 31
6	0 19 53	0 21 6	0 22 22	0 23 42	0 25 5	0 26 36	0 28 10	0 29 47	0 31 29	0 33 15	0 35 6	0 36 59	0 39 0	0 41 3	0 43 10
7	0 20 6	0 21 20	0 22 38	0 24 0	0 25 25	0 26 57	0 28 33	0 30 12	0 31 56	0 33 44	0 35 37	0 37 32	0 39 35	0 41 41	0 43 50
8	0 20 19	0 21 34	0 22 54	0 24 18	0 25 45	0 27 19	0 28 57	0 30 38	0 32 24	0 34 14	0 36 9	0 38 7	0 40 12	0 42 21	0 44 32
9	0 20 32	0 21 49	0 23 10	0 24 36	0 26 6	0 27 42	0 29 22	0 31 5	0 32 53	0 34 45	0 36 42	0 38 43	0 40 50	0 43 3	0 45 16
10	0 20 45	0 22 4	0 23 27	0 24 55	0 26 28	0 28 5	0 29 47	0 31 33	0 33 23	0 35 18	0 37 18	0 39 22	0 41 31	0 43 45	0 46 3
11	0 20 59	0 22 20	0 23 45	0 25 15	0 26 50	0 28 29	0 30 13	0 32 2	0 33 55	0 35 53	0 37 56	0 40 3	0 42 15	0 44 32	0 46 53
12	0 21 14	0 22 37	0 24 4	0 25 36	0 27 13	0 28 54	0 30 41	0 32 33	0 34 29	0 36 30	0 38 36	0 40 46	0 43 1	0 45 21	0 47 45
13	0 21 30	0 22 55	0 24 24	0 25 58	0 27 37	0 29 21	0 31 11	0 33 6	0 35 5	0 37 9	0 39 18	0 41 31	0 43 49	0 46 13	0 48 40
14	0 21 47	0 23 14	0 24 45	0 26 21	0 28 3	0 29 50	0 31 43	0 33 41	0 35 43	0 37 50	0 40 2	0 42 18	0 44 40	0 47 7	0 49 38
15	0 22 5	0 23 34	0 25 7	0 26 46	0 28 31	0 30 21	0 32 17	0 34 18	0 36 23	0 38 33	0 40 48	0 43 7	0 45 33	0 48 3	0 50 38
16	0 22 24	0 23 55	0 25 31	0 27 13	0 29 1	0 30 54	0 32 53	0 34 57	0 37 4	0 39 18	0 41 36	0 43 59	0 46 28	0 49 1	0 51 40
17	0 22 45	0 24 18	0 25 56	0 27 41	0 29 32	0 31 28	0 33 30	0 35 37	0 37 47	0 40 5	0 42 26	0 44 53	0 47 25	0 50 2	0 52 45
18	0 23 7	0 24 42	0 26 23	0 28 11	0 30 5	0 32 4	0 34 9	0 36 19	0 38 32	0 40 53	0 43 18	0 45 49	0 48 25	0 51 6	0 53 53
19	0 23 31	0 25 9	0 26 53	0 28 43	0 30 40	0 32 42	0 34 50	0 37 3	0 39 20	0 41 44	0 44 13	0 46 49	0 49 29	0 52 15	0 55 6
20	0 23 57	0 25 38	0 27 25	0 29 18	0 31 18	0 33 23	0 35 34	0 37 50	0 40 11	0 42 39	0 45 13	0 47 53	0 50 38	0 53 29	0 56 25
21	0 24 25	0 26 9	0 27 59	0 29 55	0 31 58	0 34 7	0 36 22	0 38 42	0 41 6	0 43 38	0 46 17	0 49 2	0 51 53	0 54 49	0 57 51
22	0 24 53	0 26 41	0 28 34	0 30 35	0 32 41	0 34 54	0 37 13	0 39 38	0 42 6	0 44 43	0 47 27	0 50 17	0 53 14	0 56 17	0 59 25
23	0 25 21	0 27 13	0 29 11	0 31 17	0 33 28	0 35 45	0 38 9	0 40 39	0 43 13	0 45 55	0 48 45	0 51 41	0 54 44	0 57 53	1 1 7

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 18 40	0 19 45	0 20 54	0 22 6	0 23 17	0 24 42	0 26 6	0 27 34	0 29 6	0 30 41	0 32 21	0 34 2	0 35 51	0 37 41	0 39 36
1	0 18 29	0 19 33	0 20 41	0 21 52	0 23 3	0 24 26	0 25 49	0 27 16	0 28 46	0 30 20	0 31 58	0 33 37	0 35 25	0 37 13	0 39 6
2	0 18 18	0 19 21	0 20 28	0 21 38	0 22 49	0 24 10	0 25 32	0 26 58	0 28 26	0 29 59	0 31 35	0 33 12	0 34 59	0 36 45	0 38 36
3	0 18 8	0 19 10	0 20 16	0 21 24	0 22 35	0 23 54	0 25 15	0 26 40	0 28 6	0 29 38	0 31 13	0 32 48	0 34 33	0 36 17	0 38 6
4	0 17 58	0 18 59	0 20 4	0 21 11	0 22 21	0 23 38	0 24 58	0 26 22	0 27 46	0 29 17	0 30 51	0 32 24	0 34 7	0 35 49	0 37 36
5	0 17 48	0 18 48	0 19 52	0 20 58	0 22 7	0 23 22	0 24 41	0 26 4	0 27 27	0 28 56	0 30 29	0 32 0	0 33 41	0 35 22	0 37 7
6	0 17 38	0 18 37	0 19 40	0 20 45	0 21 53	0 23 7	0 24 24	0 25 46	0 27 8	0 28 35	0 30 7	0 31 37	0 33 16	0 34 55	0 36 38
7	0 17 28	0 18 26	0 19 28	0 20 32	0 21 39	0 22 52	0 24 7	0 25 28	0 26 49	0 28 14	0 29 45	0 31 14	0 32 51	0 34 29	0 36 10
8	0 17 18	0 18 15	0 19 16	0 20 19	0 21 25	0 22 37	0 23 51	0 25 10	0 26 30	0 27 54	0 29 23	0 30 51	0 32 26	0 34 3	0 35 42
9	0 17 8	0 18 4	0 19 4	0 20 6	0 21 12	0 22 22	0 23 35	0 24 52	0 26 11	0 27 34	0 29 1	0 30 29	0 32 2	0 33 37	0 35 15
10	0 16 58	0 17 53	0 18 52	0 19 53	0 20 59	0 22 7	0 23 19	0 24 34	0 25 52	0 27 14	0 28 39	0 30 7	0 31 38	0 33 12	0 34 49
11	0 16 49	0 17 43	0 18 41	0 19 41	0 20 46	0 21 53	0 23 3	0 24 17	0 25 34	0 26 55	0 28 18	0 29 46	0 31 15	0 32 48	0 34 24
12	0 16 40	0 17 33	0 18 30	0 19 29	0 20 33	0 21 39	0 22 47	0 24 0	0 25 16	0 26 36	0 27 57	0 29 25	0 30 52	0 32 24	0 33 59
13	0 16 31	0 17 22	0 18 19	0 19 17	0 20 20	0 21 25	0 22 31	0 23 43	0 24 58	0 26 17	0 27 37	0 29 4	0 30 30	0 32 0	0 33 34
14	0 16 21	0 17 11	0 18 7	0 19 5	0 20 7	0 21 11	0 22 15	0 23 26	0 24 40	0 25 58	0 27 17	0 28 43	0 30 8	0 31 36	0 33 9
15	0 16 11	0 17 0	0 17 55	0 18 53	0 19 54	0 20 57	0 22 0	0 23 10	0 24 23	0 25 39	0 26 57	0 28 22	0 29 46	0 31 13	0 32 44
16	0 16 1	0 16 49	0 17 43	0 18 41	0 19 41	0 20 43	0 21 45	0 22 54	0 24 6	0 25 20	0 26 37	0 28 1	0 29 24	0 30 50	0 32 29
17	0 15 51	0 16 38	0 17 31	0 18 28	0 19 27	0 20 29	0 21 30	0 22 38	0 23 49	0 25 2	0 26 18	0 27 40	0 29 2	0 30 27	0 32 5
18	0 15 40	0 16 27	0 17 19	0 18 15	0 19 13	0 20 14	0 21 15	0 22 22	0 23 32	0 24 44	0 25 59	0 27 19	0 28 40	0 30 4	0 31 41
19	0 15 29	0 16 16	0 17 7	0 18 2	0 18 59	0 19 59	0 21 0	0 22 6	0 23 15	0 24 26	0 25 40	0 26 58	0 28 18	0 29 41	0 31 17
20	0 15 18	0 16 5	0 16 55	0 17 49	0 18 45	0 19 44	0 20 45	0 21 50	0 22 58	0 24 8	0 25 21	0 26 37	0 27 56	0 29 18	0 30 43
21	0 15 6	0 15 53	0 16 42	0 17 35	0 18 30	0 19 28	0 20 29	0 21 33	0 22 40	0 23 49	0 25 1	0 26 16	0 27 34	0 28 54	0 30 18
22	0 14 54	0 15 40	0 16 29	0 17 21	0 18 15	0 19 12	0 20 13	0 21 15	0 22 21	0 23 29	0 24 41	0 25 54	0 27 11	0 28 30	0 29 53
23	0 14 42	0 15 27	0 16 15	0 17 6	0 18 0	0 18 56	0 19 56	0 20 57	0 22 2	0 23 9	0 24 20	0 25 32	0 26 48	0 28 6	0 29 27

LATITUDE 45° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 41 34	0 43 36	0 45 43	0 47 53	0 50 6	0 52 23	0 54 44	0 57 8	0 59 37	1 2 9	1 4 45	1 7 24	1 10 8	1 12 54	1 15 45
1	0 42 9	0 44 13	0 46 22	0 48 34	0 50 49	0 53 8	0 55 31	0 57 58	1 0 30	1 3 5	1 5 43	1 8 24	1 11 11	1 14 0	1 16 54
2	0 42 45	0 44 51	0 47 2	0 49 16	0 51 33	0 53 55	0 56 20	0 58 50	1 1 25	1 4 3	1 6 43	1 9 27	1 12 17	1 15 8	1 18 6
3	0 43 22	0 45 30	0 47 43	0 49 59	0 52 19	0 54 43	0 57 11	0 59 44	1 2 22	1 5 3	1 7 45	1 10 32	1 13 25	1 16 19	1 19 20
4	0 44 0	0 46 10	0 48 25	0 50 44	0 53 7	0 55 33	0 58 4	1 0 40	1 3 21	1 6 5	1 8 50	1 11 40	1 14 36	1 17 30	1 20 37
5	0 44 40	0 46 52	0 49 9	0 51 31	0 53 57	0 56 26	0 59 0	1 1 38	1 4 22	1 7 9	1 9 58	1 12 51	1 15 50	1 18 52	1 21 58
6	0 45 21	0 47 36	0 49 56	0 52 20	0 54 49	0 57 21	0 59 58	1 2 38	1 5 25	1 8 16	1 11 8	1 14 5	1 17 7	1 20 13	1 23 22
7	0 46 4	0 48 22	0 50 45	0 53 11	0 55 43	0 58 18	1 0 58	1 3 41	1 6 31	1 9 25	1 12 20	1 15 21	1 18 26	1 21 36	1 24 49
8	0 46 49	0 49 10	0 51 36	0 54 5	0 56 40	0 59 18	1 2 1	1 4 47	1 7 40	1 10 37	1 13 36	1 16 41	1 19 49	1 23 2	1 26 19
9	0 47 36	0 50 0	0 52 29	0 55 2	0 57 40	1 0 21	1 3 7	1 5 57	1 8 53	1 11 53	1 14 56	1 18 5	1 21 16	1 24 32	1 27 53
10	0 48 26	0 50 53	0 53 25	0 56 2	0 58 43	1 1 28	1 4 17	1 7 11	1 10 10	1 13 13	1 16 20	1 19 33	1 22 47	1 26 7	1 29 31
11	0 49 19	0 51 50	0 54 25	0 57 5	0 59 50	1 2 39	1 5 31	1 8 29	1 11 30	1 14 37	1 17 48	1 21 4	1 24 22	1 27 46	1 31 14
12	0 50 15	0 52 49	0 55 28	0 58 11	1 1 0	1 3 52	1 6 48	1 9 50	1 12 54	1 16 5	1 19 20	1 22 39	1 26 1	1 29 29	1 33 1
13	0 51 14	0 53 51	0 56 34	0 59 20	1 2 13	1 5 8	1 8 8	1 11 14	1 14 21	1 17 37	1 20 56	1 24 18	1 27 44	1 31 16	1 34 53
14	0 52 15	0 54 56	0 57 43	1 0 32	1 3 29	1 6 27	1 9 30	1 12 41	1 15 53	1 19 13	1 22 36	1 26 2	1 29 33	1 33 9	1 36 51
15	0 53 18	0 56 3	0 58 55	1 1 46	1 4 48	1 7 50	1 10 57	1 14 13	1 17 30	1 20 54	1 24 21	1 27 51	1 31 27	1 35 9	1 38 56
16	0 54 24	0 57 13	1 0 9	1 3 3	1 6 10	1 9 17	1 12 29	1 15 50	1 19 12	1 22 40	1 26 13	1 29 49	1 33 29	1 37 17	1 41 9
17	0 55 32	0 58 26	1 1 26	1 4 25	1 7 37	1 10 49	1 14 6	1 17 32	1 20 59	1 24 32	1 28 11	1 31 53	1 35 39	1 39 33	1 43 31
18	0 56 44	0 59 43	1 2 47	1 5 53	1 9 9	1 12 27	1 15 49	1 19 20	1 22 53	1 26 32	1 30 17	1 34 5	1 37 58	1 41 57	1 46 2
19	0 58 2	1 1 6	1 4 14	1 7 28	1 10 48	1 14 12	1 17 40	1 21 15	1 24 55	1 28 40	1 32 31	1 36 25	1 40 25	1 44 31	1 48 42
20	0 59 27	1 2 36	1 5 50	1 9 10	1 12 35	1 16 5	1 19 40	1 23 20	1 27 6	1 30 57	1 34 54	1 38 55	1 43 2	1 47 15	1 51 33
21	1 0 59	1 4 14	1 7 34	1 11 0	1 14 31	1 18 7	1 21 49	1 25 34	1 29 27	1 33 24	1 37 27	1 41 35	1 45 50	1 50 10	1 54 35
22	1 2 39	1 6 0	1 9 26	1 12 58	1 16 35	1 20 17	1 24 6	1 27 58	1 31 58	1 36 2	1 40 12	1 44 28	1 48 50	1 53 17	1 57 49
23	1 4 27	1 7 54	1 11 26	1 15 4	1 18 47	1 22 37	1 26 32	1 30 33	1 34 40	1 38 52	1 43 10	1 47 34	1 52 3	1 56 38	2 1 17

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 41 34	0 43 36	0 45 43	0 47 53	0 50 6	0 52 23	0 54 44	0 57 8	0 59 37	1 2 9	1 4 45	1 7 24	1 10 8	1 12 54	1 15 45
1	0 41 2	0 43 2	0 45 5	0 47 14	0 49 25	0 51 40	0 53 58	0 56 20	0 58 47	1 1 16	1 3 49	1 6 25	1 9 6	1 11 48	1 14 35
2	0 40 30	0 42 28	0 44 28	0 46 35	0 48 44	0 50 57	0 53 13	0 55 33	0 57 58	1 0 24	1 2 54	1 5 27	1 8 5	1 10 44	1 13 28
3	0 39 58	0 41 54	0 43 52	0 45 57	0 48 4	0 50 15	0 52 29	0 54 47	0 57 10	0 59 33	1 2 0	1 4 31	1 7 6	1 9 43	1 12 24
4	0 39 26	0 41 21	0 43 16	0 45 19	0 47 25	0 49 34	0 51 46	0 54 2	0 56 22	0 58 43	1 1 8	1 3 37	1 6 9	1 8 44	1 11 22
5	0 38 55	0 40 48	0 42 41	0 44 42	0 46 46	0 48 53	0 51 3	0 53 17	0 55 35	0 57 54	1 0 17	1 2 44	1 5 14	1 7 46	1 10 22
6	0 38 24	0 40 16	0 42 7	0 44 6	0 46 8	0 48 13	0 50 21	0 52 33	0 54 49	0 57 6	0 59 27	1 1 52	1 4 20	1 6 50	1 9 24
7	0 37 54	0 39 44	0 41 34	0 43 31	0 45 31	0 47 34	0 49 40	0 51 50	0 54 4	0 56 19	0 58 38	1 1 1	1 3 27	1 5 55	1 8 27
8	0 37 25	0 39 13	0 41 2	0 42 57	0 44 55	0 46 56	0 49 0	0 51 8	0 53 20	0 55 33	0 57 50	1 0 11	1 2 35	1 5 1	1 7 31
9	0 36 57	0 38 43	0 40 30	0 42 24	0 44 20	0 46 19	0 48 21	0 50 27	0 52 36	0 54 48	0 57 3	0 59 22	1 1 44	1 4 8	1 6 36
10	0 36 30	0 38 14	0 40 1	0 41 52	0 43 46	0 45 43	0 47 43	0 49 47	0 51 54	0 54 4	0 56 17	0 58 34	1 0 54	1 3 16	1 5 42
11	0 36 4	0 37 46	0 39 32	0 41 21	0 43 13	0 45 8	0 47 6	0 49 8	0 51 13	0 53 21	0 55 32	0 57 47	1 0 5	1 2 25	1 4 49
12	0 35 38	0 37 18	0 39 3	0 40 50	0 42 40	0 44 33	0 46 30	0 48 30	0 50 33	0 52 39	0 54 48	0 57 1	0 59 17	1 1 35	1 3 57
13	0 35 12	0 36 50	0 38 34	0 40 20	0 42 8	0 43 59	0 45 54	0 47 53	0 49 54	0 51 58	0 54 5	0 56 16	0 58 30	1 0 46	1 3 6
14	0 34 46	0 36 22	0 38 5	0 39 50	0 41 36	0 43 25	0 45 18	0 47 16	0 49 15	0 51 18	0 53 23	0 55 32	0 57 44	0 59 58	1 2 16
15	0 34 20	0 35 55	0 37 36	0 39 20	0 41 4	0 42 51	0 44 43	0 46 40	0 48 37	0 50 38	0 52 42	0 54 49	0 56 59	0 59 11	1 1 27
16	0 33 54	0 35 28	0 37 7	0 38 50	0 40 33	0 42 18	0 44 8	0 46 4	0 47 59	0 49 58	0 52 1	0 54 6	0 56 14	0 58 24	1 0 38
17	0 33 28	0 35 1	0 36 38	0 38 20	0 40 2	0 41 46	0 43 34	0 45 28	0 47 21	0 49 19	0 51 20	0 53 23	0 55 29	0 57 38	0 59 50
18	0 33 2	0 34 34	0 36 10	0 37 50	0 39 31	0 41 14	0 43 0	0 44 52	0 46 44	0 48 40	0 50 39	0 52 40	0 54 44	0 56 52	0 59 2
19	0 32 36	0 34 7	0 35 42	0 37 20	0 39 0	0 40 42	0 42 27	0 44 16	0 46 7	0 48 1	0 49 58	0 51 57	0 54 0	0 56 6	0 58 14
20	0 32 10	0 33 40	0 35 14	0 36 50	0 38 29	0 40 10	0 41 54	0 43 40	0 45 30	0 47 22	0 49 17	0 51 15	0 53 16	0 55 20	0 57 26
21	0 31 44	0 33 13	0 34 45	0 36 20	0 37 57	0 39 37	0 41 20	0 43 4	0 44 53	0 46 43	0 48 36	0 50 33	0 52 32	0 54 34	0 56 38
22	0 31 18	0 32 46	0 34 16	0 35 50	0 37 25	0 39 4	0 40 46	0 42 29	0 44 16	0 46 5	0 47 56	0 49 51	0 51 48	0 53 48	0 55 51
23	0 30 51	0 32 18	0 33 47	0 35 19	0 36 53	0 38 31	0 40 11	0 41 54	0 43 39	0 45 27	0 47 16	0 49 9	0 51 5	0 53 3	0 55 4

LATITUDE 45° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 18 39	1 21 37	1 24 38	1 27 43	1 30 52	1 34 4	1 37 20	1 40 39	1 44 2	1 47 28	1 50 58	1 54 32	1 58 8	2 1 49	2 5 33
1	1 19 51	1 22 53	1 25 57	1 29 6	1 32 17	1 35 33	1 38 52	1 42 14	1 45 40	1 49 9	1 52 42	1 56 20	2 0 0	2 3 45	2 7 33
2	1 21 5	1 24 11	1 27 18	1 30 30	1 33 44	1 37 4	1 40 26	1 43 51	1 47 21	1 50 53	1 54 31	1 58 11	2 1 55	2 5 43	2 9 35
3	1 22 22	1 25 31	1 28 41	1 31 56	1 35 13	1 38 38	1 42 3	1 45 32	1 49 5	1 52 41	1 56 23	2 0 6	2 3 54	2 7 45	2 11 41
4	1 23 42	1 26 54	1 30 8	1 33 26	1 36 46	1 40 15	1 43 43	1 47 16	1 50 53	1 54 33	1 58 19	2 2 5	2 5 57	2 9 52	2 13 52
5	1 25 6	1 28 20	1 31 38	1 35 0	1 38 23	1 41 56	1 45 27	1 49 4	1 52 45	1 56 29	2 0 19	2 4 9	2 8 5	2 12 4	2 16 8
6	1 26 33	1 29 50	1 33 12	1 36 38	1 40 5	1 43 41	1 47 16	1 50 57	1 54 42	1 58 30	2 2 24	2 6 18	2 10 18	2 14 21	2 18 29
7	1 28 4	1 31 24	1 34 50	1 38 20	1 41 52	1 45 31	1 49 9	1 52 54	1 56 43	2 0 35	2 4 33	2 8 32	2 12 36	2 16 44	2 20 56
8	1 29 38	1 33 2	1 36 32	1 40 6	1 43 43	1 47 25	1 51 7	1 54 56	1 58 49	2 2 45	2 6 47	2 10 51	2 14 59	2 19 12	2 23 29
9	1 31 16	1 34 44	1 38 18	1 41 56	1 45 38	1 49 23	1 53 10	1 57 4	2 1 1	2 5 1	2 9 7	2 13 16	2 17 28	2 21 46	2 26 8
10	1 32 59	1 36 32	1 40 10	1 43 52	1 47 38	1 51 26	1 55 19	1 59 18	2 3 20	2 7 24	2 11 34	2 15 48	2 20 4	2 24 27	2 28 54
11	1 34 47	1 38 25	1 42 7	1 45 53	1 49 43	1 53 36	1 57 34	2 1 38	2 5 45	2 9 53	2 14 8	2 18 27	2 22 48	2 27 15	2 31 47
12	1 36 39	1 40 22	1 44 9	1 47 59	1 51 54	1 55 51	1 59 54	2 4 3	2 8 15	2 12 29	2 16 49	2 21 12	2 25 39	2 30 11	2 34 48
13	1 38 36	1 42 24	1 46 16	1 50 11	1 54 10	1 58 13	2 2 21	2 6 35	2 10 52	2 15 12	2 19 37	2 24 5	2 28 38	2 33 16	2 37 58
14	1 40 39	1 44 32	1 48 29	1 52 29	1 56 33	2 0 42	2 4 55	2 9 14	2 13 37	2 18 3	2 22 33	2 27 7	2 31 46	2 36 30	2 41 18
15	1 42 49	1 46 47	1 50 49	1 54 54	1 59 4	2 3 19	2 7 38	2 12 2	2 16 31	2 21 3	2 25 39	2 30 19	2 35 4	2 39 54	2 44 48
16	1 45 7	1 49 10	1 53 18	1 57 28	2 1 44	2 6 5	2 10 30	2 15 0	2 19 35	2 24 13	2 28 56	2 33 42	2 38 34	2 43 30	2 48 31
17	1 47 34	1 51 42	1 55 56	2 0 12	2 4 34	2 9 1	2 13 32	2 18 9	2 22 50	2 27 35	2 32 24	2 37 17	2 42 16	2 47 19	2 52 26
18	1 50 11	1 54 25	1 58 44	2 3 6	2 7 35	2 12 9	2 16 46	2 21 30	2 26 18	2 31 10	2 36 5	2 41 5	2 46 11	2 51 21	2 56 34
19	1 52 58	1 57 18	2 1 43	2 6 12	2 10 48	2 15 29	2 20 13	2 25 3	2 29 59	2 34 58	2 40 0	2 45 7	2 50 20	2 55 37	3 0 57
20	1 55 55	2 0 22	2 4 54	2 9 31	2 14 14	2 19 2	2 23 54	2 28 51	2 33 54	2 39 0	2 44 9	2 49 24	2 54 44	3 0 8	3 5 37
21	1 59 4	2 3 38	2 8 18	2 13 3	2 17 54	2 22 50	2 27 50	2 32 54	2 38 4	2 43 18	2 48 35	2 53 58	2 59 25	3 4 57	3 10 36
22	2 2 26	2 7 8	2 11 56	2 16 49	2 21 48	2 26 52	2 32 0	2 37 12	2 42 30	2 47 52	2 53 18	2 58 49	3 4 24	3 10 5	3 15 53
23	2 6 1	2 10 52	2 15 49	2 20 51	2 25 58	2 31 10	2 36 26	2 41 47	2 47 13	2 52 44	2 58 19	3 3 58	3 9 42	3 15 32	3 21 30

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 18 39	1 21 37	1 24 38	1 27 43	1 30 52	1 34 4	1 37 20	1 40 39	1 44 2	1 47 28	1 50 58	1 54 32	1 58 8	2 1 49	2 5 33
1	1 17 26	1 20 21	1 23 19	1 26 21	1 29 27	1 32 36	1 35 49	1 39 5	1 42 25	1 45 48	1 49 15	1 52 46	1 56 19	1 59 57	2 3 37
2	1 16 16	1 19 8	1 22 3	1 25 2	1 28 5	1 31 11	1 34 21	1 37 34	1 40 51	1 44 11	1 47 35	1 51 3	1 54 33	1 58 8	2 1 45
3	1 15 9	1 17 58	1 20 50	1 23 46	1 26 46	1 29 49	1 32 56	1 36 6	1 39 20	1 42 37	1 45 58	1 49 23	1 52 50	1 56 22	1 59 56
4	1 14 4	1 16 51	1 19 40	1 22 33	1 25 30	1 28 30	1 31 34	1 34 41	1 37 52	1 41 6	1 44 24	1 47 46	1 51 10	1 54 39	1 58 10
5	1 13 2	1 15 46	1 18 32	1 21 22	1 24 16	1 27 14	1 30 15	1 33 19	1 36 27	1 39 38	1 42 53	1 46 12	1 49 33	1 52 59	1 56 27
6	1 12 1	1 14 42	1 17 26	1 20 13	1 23 5	1 26 0	1 28 58	1 32 0	1 35 5	1 38 13	1 41 25	1 44 41	1 47 59	1 51 22	1 54 47
7	1 11 2	1 13 40	1 16 22	1 19 7	1 21 56	1 24 48	1 27 43	1 30 43	1 33 46	1 36 51	1 40 0	1 43 13	1 46 28	1 49 47	1 53 9
8	1 10 4	1 12 40	1 15 20	1 18 3	1 20 49	1 23 39	1 26 31	1 29 28	1 32 28	1 35 31	1 38 37	1 41 46	1 44 58	1 48 14	1 51 33
9	1 9 7	1 11 41	1 14 19	1 17 0	1 19 44	1 22 31	1 25 21	1 28 15	1 31 12	1 34 12	1 37 15	1 40 21	1 43 30	1 46 43	1 49 59
10	1 8 11	1 10 43	1 13 19	1 15 58	1 18 40	1 21 25	1 24 13	1 27 4	1 29 58	1 32 55	1 35 55	1 38 58	1 42 4	1 45 14	1 48 27
11	1 7 16	1 9 46	1 12 20	1 14 57	1 17 37	1 20 20	1 23 6	1 25 54	1 28 45	1 31 40	1 34 37	1 37 37	1 40 40	1 43 47	1 46 57
12	1 6 22	1 8 50	1 11 22	1 13 57	1 16 35	1 19 16	1 22 0	1 24 45	1 27 33	1 30 26	1 33 21	1 36 18	1 39 18	1 42 22	1 45 29
13	1 5 29	1 7 55	1 10 25	1 12 58	1 15 34	1 18 13	1 20 54	1 23 37	1 26 22	1 29 13	1 32 6	1 35 0	1 37 58	1 40 59	1 44 3
14	1 4 37	1 7 1	1 9 29	1 12 0	1 14 33	1 17 10	1 19 49	1 22 30	1 25 12	1 28 1	1 30 52	1 33 43	1 36 39	1 39 37	1 42 38
15	1 3 46	1 6 8	1 8 34	1 11 2	1 13 33	1 16 8	1 18 44	1 21 23	1 24 3	1 26 50	1 26 38	1 32 27	1 35 21	1 38 16	1 41 14
16	1 2 55	1 5 15	1 7 39	1 10 5	1 12 34	1 15 6	1 17 40	1 20 17	1 22 55	1 25 40	1 28 25	1 31 12	1 34 4	1 36 57	1 39 52
17	1 2 5	1 4 23	1 6 44	1 9 8	1 11 35	1 14 5	1 16 37	1 19 12	1 21 48	1 24 31	1 27 13	1 29 58	1 32 48	1 35 39	1 38 32
18	1 1 15	1 3 31	1 5 50	1 8 12	1 10 37	1 13 4	1 15 34	1 18 7	1 20 42	1 23 22	1 26 2	1 28 45	1 31 33	1 34 22	1 37 13
19	1 0 25	1 2 39	1 4 56	1 7 16	1 9 39	1 12 4	1 14 32	1 17 3	1 19 36	1 22 13	1 24 51	1 27 32	1 30 18	1 33 5	1 35 54
20	0 59 35	1 1 47	1 4 2	1 6 20	1 8 41	1 11 4	1 13 30	1 15 59	1 18 31	1 21 5	1 23 41	1 26 20	1 29 3	1 31 48	1 34 35
21	0 58 46	1 0 56	1 3 9	1 5 25	1 7 44	1 10 5	1 12 29	1 14 56	1 17 26	1 19 58	1 22 32	1 25 9	1 27 49	1 30 31	1 33 17
22	0 57 57	1 0 5	1 2 17	1 4 31	1 6 48	1 9 7	1 11 29	1 13 53	1 16 21	1 18 51	1 21 23	1 23 58	1 26 35	1 29 15	1 31 59
23	0 57 8	0 59 15	1 1 25	1 3 37	1 5 52	1 8 9	1 10 29	1 12 51	1 15 16	1 17 44	1 20 14	1 22 47	1 25 22	1 28 0	1 30 42

LATITUDE 46° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 16	0 10 22	0 10 31	0 10 44	0 11 1	0 11 22	0 11 47	0 12 15	0 12 47	0 13 23	0 14 3	0 14 47	0 15 34	0 16 25	0 17 20
1	0 10 17	0 10 23	0 10 33	0 10 46	0 11 3	0 11 25	0 11 50	0 12 19	0 12 52	0 13 28	0 14 9	0 14 54	0 15 42	0 16 34	0 17 30
2	0 10 18	0 10 25	0 10 35	0 10 48	0 11 5	0 11 28	0 11 53	0 12 23	0 12 57	0 13 33	0 14 15	0 15 1	0 15 50	0 16 43	0 17 40
3	0 10 20	0 10 27	0 10 37	0 10 50	0 11 8	0 11 31	0 11 56	0 12 27	0 13 2	0 13 38	0 14 21	0 15 8	0 15 58	0 16 52	0 17 50
4	0 10 22	0 10 29	0 10 39	0 10 52	0 11 11	0 11 34	0 11 59	0 12 31	0 13 7	0 13 44	0 14 27	0 15 15	0 16 6	0 17 1	0 18 0
5	0 10 24	0 10 31	0 10 41	0 10 54	0 11 14	0 11 37	0 12 3	0 12 35	0 13 12	0 13 50	0 14 33	0 15 22	0 16 14	0 17 10	0 18 11
6	0 10 26	0 10 33	0 10 43	0 10 56	0 11 17	0 11 40	0 12 7	0 12 39	0 13 17	0 13 56	0 14 40	0 15 29	0 16 22	0 17 19	0 18 22
7	0 10 28	0 10 35	0 10 45	0 10 59	0 11 20	0 11 43	0 12 11	0 12 43	0 13 22	0 14 2	0 14 47	0 15 37	0 16 31	0 17 29	0 18 33
8	0 10 30	0 10 37	0 10 47	0 11 2	0 11 23	0 11 46	0 12 15	0 12 48	0 13 27	0 14 8	0 14 54	0 15 45	0 16 40	0 17 39	0 18 44
9	0 10 32	0 10 39	0 10 49	0 11 5	0 11 26	0 11 50	0 12 19	0 12 53	0 13 32	0 14 14	0 15 1	0 15 53	0 16 49	0 17 49	0 18 55
10	0 10 34	0 10 41	0 10 52	0 11 8	0 11 29	0 11 54	0 12 23	0 12 58	0 13 37	0 14 20	0 15 8	0 16 1	0 16 58	0 17 59	0 19 6
11	0 10 36	0 10 43	0 10 55	0 11 11	0 11 33	0 11 57	0 12 27	0 13 3	0 13 43	0 14 26	0 15 15	0 16 9	0 17 8	0 18 10	0 19 18
12	0 10 38	0 10 45	0 10 57	0 11 14	0 11 36	0 12 0	0 12 31	0 13 8	0 13 49	0 14 32	0 15 22	0 16 18	0 17 18	0 18 21	0 19 31
13	0 10 40	0 10 47	0 10 59	0 11 17	0 11 39	0 12 4	0 12 35	0 13 13	0 13 55	0 14 39	0 15 30	0 16 27	0 17 29	0 18 33	0 19 44
14	0 10 42	0 10 49	0 11 1	0 11 20	0 11 42	0 12 8	0 12 40	0 13 18	0 14 1	0 14 46	0 15 38	0 16 37	0 17 40	0 18 46	0 19 58
15	0 10 44	0 10 51	0 11 3	0 11 23	0 11 45	0 12 12	0 12 45	0 13 24	0 14 8	0 14 54	0 15 47	0 16 47	0 17 52	0 19 0	0 20 13
16	0 10 45	0 10 53	0 11 5	0 11 25	0 11 48	0 12 16	0 12 50	0 13 30	0 14 15	0 15 2	0 15 56	0 16 57	0 18 4	0 19 14	0 20 29
17	0 10 46	0 10 55	0 11 7	0 11 27	0 11 51	0 12 20	0 12 55	0 13 36	0 14 22	0 15 11	0 16 6	0 17 8	0 18 17	0 19 29	0 20 46
18	0 10 47	0 10 56	0 11 9	0 11 29	0 11 54	0 12 24	0 13 0	0 13 42	0 14 29	0 15 20	0 16 17	0 17 20	0 18 31	0 19 45	0 21 4
19	0 10 48	0 10 57	0 11 11	0 11 31	0 11 57	0 12 28	0 13 5	0 13 48	0 14 36	0 15 29	0 16 28	0 17 33	0 18 46	0 20 2	0 21 23
20	0 10 49	0 10 58	0 11 13	0 11 33	0 12 0	0 12 32	0 13 10	0 13 54	0 14 43	0 15 39	0 16 40	0 17 47	0 19 1	0 20 19	0 21 43
21	0 10 50	0 10 59	0 11 14	0 11 35	0 12 3	0 12 35	0 13 15	0 14 0	0 14 51	0 15 49	0 16 52	0 18 1	0 19 16	0 20 37	0 22 4
22	0 10 51	0 11 0	0 11 15	0 11 37	0 12 6	0 12 39	0 13 20	0 14 6	0 14 59	0 15 59	0 17 4	0 18 15	0 19 32	0 20 56	0 22 25
23	0 10 51	0 11 0	0 11 16	0 11 39	0 12 8	0 12 43	0 13 25	0 14 13	0 15 7	0 16 9	0 17 16	0 18 30	0 19 49	0 21 15	0 22 47

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 16	0 10 22	0 10 31	0 10 44	0 11 1	0 11 22	0 11 47	0 12 15	0 12 47	0 13 23	0 14 3	0 14 47	0 15 34	0 16 25	0 17 20
1	0 10 14	0 10 20	0 10 29	0 10 41	0 10 58	0 11 19	0 11 44	0 12 11	0 12 43	0 13 18	0 13 58	0 14 41	0 15 27	0 16 18	0 17 12
2	0 10 12	0 10 18	0 10 27	0 10 38	0 10 55	0 11 16	0 11 40	0 12 7	0 12 39	0 13 13	0 13 53	0 14 35	0 15 20	0 16 10	0 17 4
3	0 10 10	0 10 16	0 10 24	0 10 35	0 10 52	0 11 13	0 11 36	0 12 3	0 12 35	0 13 8	0 13 47	0 14 29	0 15 13	0 16 2	0 16 56
4	0 10 8	0 10 13	0 10 21	0 10 32	0 10 49	0 11 10	0 11 32	0 11 59	0 12 30	0 13 3	0 13 41	0 14 23	0 15 6	0 15 54	0 16 47
5	0 10 5	0 10 10	0 10 18	0 10 29	0 10 46	0 11 7	0 11 28	0 11 55	0 12 25	0 12 58	0 13 35	0 14 17	0 14 59	0 15 46	0 16 38
6	0 10 2	0 10 7	0 10 15	0 10 26	0 10 43	0 11 3	0 11 24	0 11 51	0 12 20	0 12 53	0 13 29	0 14 10	0 14 52	0 15 38	0 16 29
7	0 9 59	0 10 4	0 10 12	0 10 23	0 10 40	0 10 59	0 11 20	0 11 47	0 12 15	0 12 48	0 13 23	0 14 3	0 14 45	0 15 30	0 16 20
8	0 9 56	0 10 1	0 10 9	0 10 20	0 10 37	0 10 55	0 11 16	0 11 42	0 12 10	0 12 43	0 13 17	0 13 56	0 14 38	0 15 22	0 16 11
9	0 9 53	0 9 58	0 10 6	0 10 17	0 10 33	0 10 51	0 11 12	0 11 37	0 12 5	0 12 37	0 13 11	0 13 49	0 14 31	0 15 14	0 16 2
10	0 9 50	0 9 55	0 10 3	0 10 14	0 10 29	0 10 47	0 11 8	0 11 32	0 12 0	0 12 31	0 13 5	0 13 42	0 14 23	0 15 6	0 15 53
11	0 9 46	0 9 51	0 9 59	0 10 10	0 10 25	0 10 42	0 11 3	0 11 27	0 11 54	0 12 25	0 12 58	0 13 35	0 14 15	0 14 58	0 15 44
12	0 9 42	0 9 47	0 9 55	0 10 6	0 10 21	0 10 37	0 10 58	0 11 22	0 11 48	0 12 19	0 12 51	0 13 28	0 14 7	0 14 50	0 15 35
13	0 9 38	0 9 43	0 9 51	0 10 2	0 10 17	0 10 32	0 10 53	0 11 17	0 11 42	0 12 13	0 12 44	0 13 21	0 13 59	0 14 42	0 15 26
14	0 9 34	0 9 39	0 9 47	0 9 58	0 10 12	0 10 27	0 10 48	0 11 12	0 11 36	0 12 7	0 12 37	0 13 14	0 13 51	0 14 34	0 15 17
15	0 9 30	0 9 35	0 9 43	0 9 53	0 10 7	0 10 22	0 10 43	0 11 6	0 11 30	0 12 1	0 12 30	0 13 7	0 13 43	0 14 25	0 15 8
16	0 9 26	0 9 31	0 9 38	0 9 48	0 10 2	0 10 17	0 10 38	0 11 0	0 11 24	0 11 54	0 12 23	0 12 59	0 13 35	0 14 16	0 14 59
17	0 9 21	0 9 26	0 9 33	0 9 43	0 9 57	0 10 12	0 10 32	0 10 54	0 11 18	0 11 47	0 12 16	0 12 51	0 13 27	0 14 7	0 14 49
18	0 9 16	0 9 21	0 9 28	0 9 38	0 9 51	0 10 6	0 10 26	0 10 47	0 11 12	0 11 40	0 12 9	0 12 43	0 13 19	0 13 58	0 14 39
19	0 9 11	0 9 15	0 9 22	0 9 32	0 9 45	0 10 0	0 10 19	0 10 40	0 11 5	0 11 32	0 12 1	0 12 34	0 13 10	0 13 48	0 14 29
20	0 9 5	0 9 9	0 9 16	0 9 26	0 9 39	0 9 54	0 10 12	0 10 33	0 10 57	0 11 24	0 11 53	0 12 25	0 13 1	0 13 38	0 14 19
21	0 8 58	0 9 2	0 9 9	0 9 19	0 9 32	0 9 47	0 10 4	0 10 25	0 10 48	0 11 15	0 11 44	0 12 15	0 12 51	0 13 27	0 14 8
22	0 8 51	0 8 55	0 9 2	0 9 11	0 9 24	0 9 39	0 9 56	0 10 16	0 10 39	0 11 6	0 11 34	0 12 5	0 12 40	0 13 16	0 13 56
23	0 8 43	0 8 47	0 8 54	0 9 3	0 9 15	0 9 30	0 9 47	0 10 7	0 10 30	0 10 56	0 11 24	0 11 55	0 12 28	0 13 5	0 13 44

LATITUDE 46° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 18 18	0 19 21	0 20 27	0 21 37	0 22 51	0 24 8	0 25 29	0 26 54	0 28 23	0 29 55	0 31 31	0 33 10	0 34 53	0 36 41	0 38 31
1	0 18 29	0 19 34	0 20 39	0 21 50	0 23 5	0 24 23	0 25 45	0 27 11	0 28 42	0 30 16	0 31 54	0 33 35	0 35 20	0 37 10	0 39 2
2	0 18 40	0 19 47	0 20 51	0 22 4	0 23 20	0 24 39	0 26 2	0 27 29	0 29 2	0 30 38	0 32 18	0 34 1	0 35 48	0 37 40	0 39 34
3	0 18 52	0 20 0	0 21 4	0 22 18	0 23 36	0 24 56	0 26 20	0 27 48	0 29 23	0 31 1	0 32 43	0 34 28	0 36 17	0 38 11	0 40 7
4	0 19 4	0 20 13	0 21 18	0 22 33	0 23 52	0 25 14	0 26 39	0 28 9	0 29 45	0 31 25	0 33 9	0 34 56	0 36 47	0 38 43	0 40 41
5	0 19 16	0 20 26	0 21 32	0 22 48	0 24 9	0 25 32	0 26 59	0 28 31	0 30 8	0 31 50	0 33 36	0 35 25	0 37 18	0 39 16	0 41 16
6	0 19 28	0 20 39	0 21 47	0 23 4	0 24 26	0 25 51	0 27 20	0 28 54	0 30 32	0 32 16	0 34 4	0 35 55	0 37 50	0 39 50	0 41 52
7	0 19 40	0 20 52	0 22 2	0 23 21	0 24 44	0 26 11	0 27 42	0 29 18	0 30 58	0 32 43	0 34 33	0 36 26	0 38 23	0 40 25	0 42 29
8	0 19 52	0 21 5	0 22 18	0 23 39	0 25 3	0 26 32	0 28 5	0 29 43	0 31 25	0 33 12	0 35 3	0 36 58	0 38 57	0 41 1	0 43 8
9	0 20 4	0 21 18	0 22 35	0 23 57	0 25 23	0 26 54	0 28 29	0 30 9	0 31 53	0 33 42	0 35 35	0 37 32	0 39 33	0 41 40	0 43 50
10	0 20 16	0 21 32	0 22 52	0 24 16	0 25 44	0 27 17	0 28 54	0 30 36	0 32 22	0 34 13	0 36 8	0 38 8	0 40 12	0 42 21	0 44 35
11	0 20 28	0 21 46	0 23 9	0 24 35	0 26 5	0 27 40	0 29 19	0 31 4	0 32 52	0 34 45	0 36 43	0 38 46	0 40 53	0 43 6	0 45 23
12	0 20 41	0 22 1	0 23 26	0 24 54	0 26 27	0 28 4	0 29 46	0 31 33	0 33 23	0 35 19	0 37 20	0 39 26	0 41 36	0 43 52	0 46 12
13	0 20 55	0 22 17	0 23 44	0 25 14	0 26 50	0 28 29	0 30 14	0 32 3	0 33 55	0 35 54	0 37 58	0 40 7	0 42 20	0 44 39	0 47 3
14	0 21 11	0 22 34	0 24 3	0 25 35	0 27 13	0 28 55	0 30 43	0 32 34	0 34 29	0 36 31	0 38 38	0 40 50	0 43 6	0 45 28	0 47 55
15	0 21 28	0 22 53	0 24 24	0 25 57	0 27 37	0 29 22	0 31 13	0 33 7	0 35 5	0 37 10	0 39 20	0 41 35	0 43 54	0 46 19	0 48 49
16	0 21 47	0 23 14	0 24 46	0 26 21	0 28 3	0 29 51	0 31 45	0 33 42	0 35 43	0 37 51	0 40 4	0 42 22	0 44 45	0 47 13	0 49 46
17	0 22 7	0 23 36	0 25 9	0 26 47	0 28 31	0 30 22	0 32 19	0 34 19	0 36 23	0 38 34	0 40 50	0 43 11	0 45 38	0 48 10	0 50 46
18	0 22 28	0 23 59	0 25 34	0 27 15	0 29 1	0 30 55	0 32 55	0 34 58	0 37 5	0 39 19	0 41 38	0 44 2	0 46 33	0 49 9	0 51 49
19	0 22 50	0 24 23	0 26 1	0 27 45	0 29 34	0 31 30	0 33 33	0 35 39	0 37 49	0 40 6	0 42 28	0 44 56	0 47 31	0 50 11	0 52 54
20	0 23 13	0 24 48	0 26 29	0 28 17	0 30 9	0 32 8	0 34 14	0 36 23	0 38 36	0 40 56	0 43 22	0 45 54	0 48 33	0 51 17	0 54 5
21	0 23 37	0 25 14	0 26 59	0 28 51	0 30 46	0 32 48	0 34 57	0 37 10	0 39 27	0 41 51	0 44 21	0 46 57	0 49 39	0 52 27	0 55 20
22	0 24 1	0 25 41	0 27 30	0 29 25	0 31 24	0 33 30	0 35 42	0 37 59	0 40 21	0 42 50	0 45 24	0 48 4	0 50 50	0 53 43	0 56 41
23	0 24 26	0 26 11	0 28 2	0 30 0	0 32 4	0 34 14	0 36 30	0 38 52	0 41 19	0 43 52	0 46 30	0 49 15	0 52 7	0 55 5	0 58 10

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 18 18	0 19 21	0 20 27	0 21 37	0 22 51	0 24 8	0 25 29	0 26 54	0 28 23	0 29 55	0 31 31	0 33 10	0 34 53	0 36 41	0 38 31
1	0 18 9	0 19 10	0 20 15	0 21 24	0 22 37	0 23 53	0 25 13	0 26 37	0 28 4	0 29 35	0 31 10	0 32 46	0 34 27	0 36 13	0 38 2
2	0 18 0	0 18 59	0 20 3	0 21 11	0 22 23	0 23 38	0 24 57	0 26 20	0 27 46	0 29 15	0 30 49	0 32 22	0 34 1	0 35 46	0 37 33
3	0 17 51	0 18 48	0 19 51	0 20 58	0 22 9	0 23 23	0 24 41	0 26 3	0 27 28	0 28 55	0 30 28	0 31 59	0 33 36	0 35 20	0 37 5
4	0 17 42	0 18 37	0 19 40	0 20 46	0 21 56	0 23 8	0 24 26	0 25 46	0 27 10	0 28 35	0 30 7	0 31 36	0 33 11	0 34 54	0 36 38
5	0 17 33	0 18 27	0 19 29	0 20 34	0 21 43	0 22 53	0 24 10	0 25 29	0 26 52	0 28 16	0 29 46	0 31 14	0 32 47	0 34 29	0 36 11
6	0 17 24	0 18 17	0 19 18	0 20 22	0 21 30	0 22 39	0 23 54	0 25 12	0 26 34	0 27 57	0 29 25	0 30 52	0 32 23	0 34 4	0 35 45
7	0 17 14	0 18 7	0 19 7	0 20 10	0 21 17	0 22 25	0 23 39	0 24 55	0 26 16	0 27 38	0 29 4	0 30 31	0 32 0	0 33 40	0 35 19
8	0 17 4	0 17 57	0 18 56	0 19 58	0 21 4	0 22 11	0 23 24	0 24 38	0 25 58	0 27 19	0 28 44	0 30 10	0 31 37	0 33 16	0 34 54
9	0 16 54	0 17 47	0 18 45	0 19 46	0 20 51	0 21 57	0 23 9	0 24 22	0 25 40	0 27 0	0 28 24	0 29 49	0 31 15	0 32 53	0 34 29
10	0 16 44	0 17 37	0 18 34	0 19 34	0 20 37	0 21 43	0 22 53	0 24 6	0 25 22	0 26 41	0 28 4	0 29 29	0 30 54	0 32 31	0 34 5
11	0 16 34	0 17 27	0 18 23	0 19 22	0 20 24	0 21 29	0 22 38	0 23 50	0 25 5	0 26 23	0 27 45	0 29 9	0 30 33	0 32 9	0 33 41
12	0 16 24	0 17 17	0 18 12	0 19 10	0 20 11	0 21 15	0 22 23	0 23 34	0 24 48	0 26 5	0 27 26	0 28 49	0 30 12	0 31 46	0 33 17
13	0 16 14	0 17 7	0 18 1	0 18 58	0 19 58	0 21 1	0 22 8	0 23 18	0 24 31	0 25 47	0 27 7	0 28 29	0 29 51	0 31 23	0 32 53
14	0 16 4	0 16 57	0 17 50	0 18 46	0 19 45	0 20 47	0 21 53	0 23 2	0 24 14	0 25 29	0 26 48	0 28 9	0 29 30	0 31 0	0 32 29
15	0 15 54	0 16 46	0 17 39	0 18 34	0 19 32	0 20 33	0 21 38	0 22 46	0 23 57	0 25 11	0 26 29	0 27 49	0 29 9	0 30 37	0 32 5
16	0 15 44	0 16 35	0 17 28	0 18 22	0 19 19	0 20 19	0 21 23	0 22 30	0 23 40	0 24 53	0 26 10	0 27 29	0 28 48	0 30 14	0 31 41
17	0 15 34	0 16 24	0 17 16	0 18 9	0 19 6	0 20 5	0 21 8	0 22 14	0 23 23	0 24 35	0 25 51	0 27 8	0 28 27	0 29 51	0 31 17
18	0 15 24	0 16 13	0 17 4	0 17 56	0 18 53	0 19 51	0 20 53	0 21 58	0 23 6	0 24 16	0 25 31	0 26 47	0 28 6	0 29 28	0 30 53
19	0 15 13	0 16 1	0 16 51	0 17 43	0 18 38	0 19 37	0 20 38	0 21 41	0 22 49	0 23 57	0 25 11	0 26 26	0 27 44	0 29 5	0 30 29
20	0 15 2	0 15 49	0 16 38	0 17 30	0 18 24	0 19 22	0 20 22	0 21 25	0 22 31	0 23 39	0 24 51	0 26 5	0 27 22	0 28 42	0 30 4
21	0 14 50	0 15 36	0 16 24	0 17 16	0 18 9	0 19 6	0 20 5	0 21 8	0 22 12	0 23 20	0 24 30	0 25 43	0 26 59	0 28 18	0 29 39
22	0 14 38	0 15 23	0 16 10	0 17 1	0 17 54	0 18 50	0 19 48	0 20 51	0 21 53	0 23 0	0 24 9	0 25 21	0 26 36	0 27 54	0 29 14
23	0 14 25	0 15 9	0 15 56	0 16 46	0 17 38	0 18 33	0 19 31	0 20 31	0 21 34	0 22 40	0 23 48	0 24 59	0 26 13	0 27 29	0 28 48

LATITUDE 46° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 40 25	0 42 24	0 44 25	0 46 31	0 48 40	0 50 52	0 53 8	0 55 29	0 57 52	1 0 19	1 2 50	1 5 24	1 8 2	1 10 42	1 13 28
1	0 40 58	0 42 59	0 45 2	0 47 10	0 49 21	0 51 35	0 53 53	0 56 16	0 58 42	1 1 12	1 3 42	1 6 18	1 8 59	1 11 42	1 14 31
2	0 41 32	0 43 35	0 45 40	0 47 50	0 50 3	0 52 19	0 54 40	0 57 5	0 59 34	1 2 6	1 4 36	1 7 15	1 9 59	1 12 45	1 15 37
3	0 42 7	0 44 12	0 46 19	0 48 31	0 50 46	0 53 4	0 55 29	0 57 56	1 0 28	1 3 2	1 5 33	1 8 15	1 11 2	1 13 51	1 16 46
4	0 42 43	0 44 50	0 46 59	0 49 13	0 51 30	0 53 51	0 56 19	0 58 49	1 1 24	1 4 0	1 6 33	1 9 18	1 12 8	1 15 0	1 17 58
5	0 43 20	0 45 29	0 47 40	0 49 56	0 52 16	0 54 40	0 57 11	0 59 44	1 2 22	1 5 0	1 7 36	1 10 24	1 13 17	1 16 12	1 19 13
6	0 43 58	0 46 9	0 48 22	0 50 40	0 53 3	0 55 30	0 58 5	1 0 41	1 3 22	1 6 3	1 8 42	1 11 33	1 14 29	1 17 27	1 20 31
7	0 44 37	0 46 51	0 49 7	0 51 27	0 53 53	0 56 23	0 59 1	1 1 40	1 4 24	1 7 8	1 9 51	1 12 45	1 15 44	1 18 45	1 21 52
8	0 45 19	0 47 35	0 49 54	0 52 17	0 54 46	0 57 19	0 59 59	1 2 41	1 5 28	1 8 15	1 11 3	1 14 0	1 17 2	1 20 7	1 23 17
9	0 46 4	0 48 22	0 50 44	0 53 10	0 55 42	0 58 18	1 1 0	1 3 45	1 6 34	1 9 25	1 12 19	1 15 19	1 18 24	1 21 33	1 24 46
10	0 46 52	0 49 13	0 51 38	0 54 7	0 56 42	0 59 21	1 2 4	1 4 52	1 7 44	1 10 39	1 13 39	1 16 42	1 19 50	1 23 3	1 26 20
11	0 47 43	0 50 7	0 52 36	0 55 8	0 57 46	1 0 30	1 3 11	1 6 3	1 8 59	1 11 58	1 15 3	1 18 10	1 21 22	1 24 37	1 27 58
12	0 48 35	0 51 3	0 53 36	0 56 11	0 58 53	1 1 41	1 4 21	1 7 57	1 10 18	1 13 21	1 16 30	1 19 41	1 22 57	1 26 15	1 29 40
13	0 49 30	0 52 1	0 54 38	0 57 16	1 0 2	1 2 54	1 5 35	1 8 35	1 11 40	1 14 47	1 18 0	1 21 15	1 24 35	1 27 57	1 31 26
14	0 50 27	0 53 1	0 55 42	0 58 23	1 1 13	1 4 9	1 6 52	1 9 57	1 13 5	1 16 16	1 19 33	1 22 52	1 26 16	1 29 44	1 33 16
15	0 51 26	0 54 3	0 56 48	0 59 32	1 2 26	1 5 26	1 8 13	1 11 22	1 14 33	1 17 48	1 21 9	1 24 33	1 28 1	1 31 35	1 35 11
16	0 52 27	0 55 8	0 57 54	1 0 44	1 3 42	1 6 45	1 9 38	1 12 50	1 16 5	1 19 25	1 22 50	1 26 19	1 29 51	1 33 30	1 37 11
17	0 53 30	0 56 15	0 59 5	1 1 59	1 5 1	1 8 7	1 11 7	1 14 22	1 17 42	1 21 7	1 24 37	1 28 11	1 31 47	1 35 32	1 39 18
18	0 54 36	0 57 25	1 0 19	1 3 17	1 6 23	1 9 33	1 12 41	1 16 0	1 19 25	1 22 55	1 26 30	1 30 9	1 33 51	1 37 41	1 41 32
19	0 55 45	0 58 39	1 1 37	1 4 40	1 7 50	1 11 4	1 14 21	1 17 45	1 21 15	1 24 50	1 28 30	1 32 15	1 36 3	1 39 58	1 43 55
20	0 56 59	0 59 58	1 3 2	1 6 10	1 9 24	1 12 43	1 16 8	1 19 38	1 23 13	1 26 53	1 30 38	1 34 29	1 38 24	1 42 24	1 46 28
21	0 58 19	1 1 23	1 4 33	1 7 47	1 11 7	1 14 32	1 18 3	1 21 39	1 25 20	1 29 5	1 32 55	1 36 52	1 40 54	1 45 0	1 49 11
22	0 59 46	1 2 55	1 6 11	1 9 31	1 12 57	1 16 29	1 20 6	1 23 48	1 27 35	1 31 26	1 35 22	1 39 25	1 43 33	1 47 46	1 52 4
23	1 1 20	1 4 36	1 7 57	1 11 24	1 14 56	1 18 34	1 22 17	1 26 5	1 29 58	1 33 56	1 37 59	1 42 8	1 46 23	1 50 43	1 55 9

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 40 25	0 42 24	0 44 25	0 46 31	0 48 40	0 50 52	0 53 8	0 55 29	0 57 52	1 0 19	1 2 50	1 5 24	1 8 2	1 10 42	1 13 28
1	0 39 54	0 41 51	0 43 50	0 45 54	0 47 59	0 50 11	0 52 22	0 54 41	0 57 2	0 59 27	1 1 56	1 4 28	1 7 3	1 9 40	1 12 24
2	0 39 24	0 41 19	0 43 16	0 45 18	0 47 20	0 49 31	0 51 38	0 53 55	0 56 14	0 58 37	1 1 4	1 3 33	1 6 5	1 8 40	1 11 21
3	0 38 54	0 40 47	0 42 42	0 44 42	0 46 42	0 48 51	0 50 56	0 53 11	0 55 28	0 57 49	1 0 13	1 2 39	1 5 9	1 7 42	1 10 26
4	0 38 25	0 40 16	0 42 9	0 44 7	0 46 5	0 48 12	0 50 15	0 52 28	0 54 43	0 57 2	0 59 24	1 1 47	1 4 15	1 6 46	1 9 21
5	0 37 57	0 39 46	0 41 37	0 43 33	0 45 29	0 47 34	0 49 36	0 51 46	0 53 59	0 56 16	0 58 36	1 0 57	1 3 23	1 5 52	1 8 24
6	0 37 29	0 39 16	0 41 6	0 43 0	0 44 54	0 46 57	0 48 58	0 51 6	0 53 17	0 55 32	0 57 50	1 0 9	1 2 33	1 5 0	1 7 29
7	0 37 2	0 38 47	0 40 35	0 42 28	0 44 20	0 46 21	0 48 21	0 50 27	0 52 36	0 54 49	0 57 5	0 59 22	1 1 44	1 4 9	1 6 36
8	0 36 35	0 38 19	0 40 5	0 41 56	0 43 47	0 45 46	0 47 45	0 49 49	0 51 56	0 54 7	0 56 21	0 58 36	1 0 56	1 3 19	1 5 44
9	0 36 9	0 37 51	0 39 36	0 41 25	0 43 15	0 45 12	0 47 10	0 49 12	0 51 17	0 53 26	0 55 38	0 57 51	1 0 9	1 2 30	1 4 53
10	0 35 43	0 37 24	0 39 8	0 40 55	0 42 45	0 44 39	0 46 36	0 48 36	0 50 39	0 52 46	0 54 55	0 57 7	0 59 23	1 1 42	1 4 3
11	0 35 18	0 36 58	0 38 41	0 40 26	0 42 15	0 44 7	0 46 3	0 48 1	0 50 2	0 52 7	0 54 14	0 56 24	0 58 38	1 0 55	1 3 14
12	0 34 53	0 36 32	0 38 13	0 39 57	0 41 45	0 43 35	0 45 30	0 47 26	0 49 25	0 51 28	0 53 33	0 55 41	0 57 53	1 0 8	1 2 25
13	0 34 28	0 36 6	0 37 45	0 39 28	0 41 15	0 43 3	0 44 57	0 46 51	0 48 48	0 50 49	0 52 53	0 54 59	0 57 9	0 59 22	1 1 37
14	0 34 3	0 35 40	0 37 17	0 38 59	0 40 45	0 42 31	0 44 24	0 46 16	0 48 11	0 50 10	0 52 13	0 54 17	0 56 25	0 58 36	1 0 49
15	0 33 38	0 35 13	0 36 49	0 38 30	0 40 14	0 41 59	0 43 50	0 45 41	0 47 35	0 49 31	0 51 33	0 53 35	0 55 41	0 57 51	1 0 1
16	0 33 13	0 34 46	0 36 21	0 38 1	0 39 43	0 41 27	0 43 16	0 45 6	0 46 59	0 48 53	0 50 53	0 52 53	0 54 58	0 57 6	0 59 14
17	0 32 48	0 34 19	0 35 53	0 37 32	0 39 12	0 40 55	0 42 42	0 44 31	0 46 23	0 48 15	0 50 13	0 52 11	0 54 15	0 56 21	0 58 27
18	0 32 22	0 33 52	0 35 25	0 37 2	0 38 41	0 40 23	0 42 8	0 43 56	0 45 46	0 47 37	0 49 33	0 51 30	0 53 32	0 55 36	0 57 40
19	0 31 56	0 33 25	0 34 57	0 36 32	0 38 10	0 39 51	0 41 34	0 43 21	0 45 9	0 46 59	0 48 53	0 50 49	0 52 49	0 54 51	0 56 54
20	0 31 30	0 32 58	0 34 29	0 36 2	0 37 39	0 39 18	0 41 0	0 42 45	0 44 32	0 46 21	0 48 13	0 50 8	0 52 6	0 54 6	0 56 8
21	0 31 4	0 32 30	0 34 0	0 35 32	0 37 7	0 38 45	0 40 26	0 42 9	0 43 55	0 45 43	0 47 33	0 49 26	0 51 23	0 53 21	0 55 22
22	0 30 37	0 32 2	0 33 31	0 35 2	0 36 35	0 38 12	0 39 51	0 41 33	0 43 17	0 45 4	0 46 53	0 48 45	0 50 40	0 52 37	0 54 36
23	0 30 10	0 31 34	0 33 1	0 34 31	0 36 3	0 37 38	0 39 16	0 40 56	0 42 39	0 44 25	0 46 13	0 48 4	0 49 57	0 51 53	0 53 52

LATITUDE 46° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 16 16	1 19 8	1 22 4	1 25 3	1 28 4	1 31 11	1 34 20	1 37 33	1 40 49	1 44 9	1 47 31	1 50 58	1 54 28	1 58 1	2 1 37
1	1 17 23	1 20 19	1 23 13	1 26 15	1 29 16	1 32 26	1 35 42	1 38 58	1 42 17	1 45 40	1 49 6	1 52 36	1 56 9	1 59 45	2 3 25
2	1 18 32	1 21 31	1 24 26	1 27 31	1 30 31	1 33 44	1 37 8	1 40 27	1 43 49	1 47 15	1 50 45	1 54 18	1 57 54	2 1 34	2 5 18
3	1 19 44	1 22 46	1 25 43	1 28 51	1 31 51	1 35 7	1 38 38	1 42 0	1 45 25	1 48 54	1 52 28	1 56 5	1 59 44	2 3 28	2 7 16
4	1 20 59	1 24 4	1 27 4	1 30 15	1 33 17	1 36 36	1 40 12	1 43 37	1 47 6	1 50 38	1 54 16	1 57 57	2 1 39	2 5 27	2 9 19
5	1 22 17	1 25 25	1 28 29	1 31 43	1 34 48	1 38 10	1 41 50	1 45 18	1 48 51	1 52 27	1 56 9	1 59 54	2 3 39	2 7 31	2 11 27
6	1 23 38	1 26 49	1 29 58	1 33 15	1 36 24	1 39 49	1 43 33	1 47 4	1 50 41	1 54 21	1 58 7	2 1 55	2 5 44	2 9 40	2 13 40
7	1 25 2	1 28 16	1 31 30	1 34 51	1 38 5	1 41 33	1 45 20	1 48 55	1 52 36	1 56 20	2 0 9	2 4 1	2 7 54	2 11 54	2 15 58
8	1 26 30	1 29 47	1 33 6	1 36 31	1 39 51	1 43 23	1 47 11	1 50 50	1 54 35	1 58 23	2 2 16	2 6 12	2 10 9	2 14 13	2 18 21
9	1 28 3	1 31 23	1 34 46	1 38 15	1 41 42	1 45 18	1 49 6	1 52 50	1 56 39	2 0 31	2 4 27	2 8 27	2 12 29	2 16 37	2 20 49
10	1 29 41	1 33 4	1 36 31	1 40 3	1 43 39	1 47 20	1 51 6	1 54 55	1 58 48	2 2 44	2 6 44	2 10 47	2 14 54	2 19 6	2 23 23
11	1 31 23	1 34 51	1 38 24	1 42 1	1 45 40	1 49 26	1 53 10	1 57 4	2 1 2	2 5 2	2 9 7	2 13 13	2 17 25	2 21 42	2 26 4
12	1 33 9	1 36 42	1 40 19	1 44 1	1 47 45	1 51 36	1 55 18	1 59 17	2 3 20	2 7 25	2 11 35	2 15 46	2 20 3	2 24 25	2 28 52
13	1 34 59	1 38 37	1 42 18	1 46 5	1 49 54	1 53 50	1 57 32	2 1 36	2 5 44	2 9 54	2 14 9	2 18 26	2 22 48	2 27 15	2 31 47
14	1 36 53	1 40 36	1 44 21	1 48 13	1 52 7	1 56 8	1 59 53	2 4 2	2 8 15	2 12 30	2 16 51	2 21 14	2 25 41	2 30 13	2 34 50
15	1 38 52	1 42 40	1 46 29	1 50 26	1 54 25	1 58 31	2 2 22	2 6 36	2 10 54	2 15 15	2 19 41	2 24 10	2 28 42	2 33 20	2 38 2
16	1 40 57	1 44 50	1 48 43	1 52 45	1 56 50	2 1 1	2 5 0	2 9 19	2 13 43	2 18 10	2 22 40	2 27 15	2 31 53	2 36 37	2 41 24
17	1 43 9	1 47 7	1 51 4	1 55 12	1 59 23	2 3 39	2 7 48	2 12 13	2 16 42	2 21 16	2 25 50	2 30 31	2 35 15	2 40 5	2 44 58
18	1 45 28	1 49 31	1 53 34	1 57 48	2 2 6	2 6 27	2 10 47	2 15 18	2 19 53	2 24 33	2 29 12	2 33 59	2 38 50	2 43 46	2 48 45
19	1 47 56	1 52 4	1 56 15	2 0 35	2 5 0	2 9 27	2 13 57	2 18 34	2 23 15	2 28 1	2 32 47	2 37 41	2 42 39	2 47 41	2 52 46
20	1 50 35	1 54 48	1 59 8	2 3 34	2 8 5	2 12 39	2 17 18	2 22 1	2 26 48	2 31 40	2 36 36	2 41 37	2 46 42	2 51 51	2 57 3
21	1 53 25	1 57 46	2 2 13	2 6 46	2 11 23	2 16 4	2 20 50	2 25 40	2 30 35	2 35 35	2 40 31	2 45 47	2 51 0	2 56 16	3 1 36
22	1 56 27	2 0 56	2 5 31	2 10 11	2 14 54	2 19 42	2 24 35	2 29 32	2 34 35	2 39 43	2 44 39	2 50 11	2 55 32	3 0 56	3 6 24
23	1 59 41	2 4 19	2 9 2	2 13 49	2 18 39	2 23 34	2 28 34	2 33 39	2 38 50	2 44 6	2 49 26	2 54 50	3 0 19	3 5 51	3 11 28

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 16 16	1 19 8	1 22 4	1 25 3	1 28 4	1 31 11	1 34 20	1 37 33	1 40 49	1 44 9	1 47 31	1 50 58	1 54 28	1 58 1	2 1 37
1	1 15 9	1 17 59	1 20 52	1 23 49	1 26 48	1 29 51	1 32 57	1 36 7	1 39 20	1 42 37	1 45 56	1 49 20	1 52 47	1 56 17	1 59 50
2	1 14 4	1 16 52	1 19 42	1 22 37	1 25 33	1 28 33	1 31 36	1 34 43	1 37 53	1 41 7	1 44 23	1 47 44	1 51 8	1 54 35	1 58 5
3	1 13 1	1 15 47	1 18 34	1 21 27	1 24 20	1 27 17	1 30 17	1 33 21	1 36 28	1 39 39	1 42 52	1 46 10	1 49 31	1 52 56	1 56 23
4	1 12 0	1 14 44	1 17 28	1 20 19	1 23 9	1 26 3	1 29 0	1 32 1	1 35 5	1 38 14	1 41 24	1 44 39	1 47 57	1 51 19	1 54 43
5	1 11 1	1 13 42	1 16 24	1 19 12	1 22 0	1 24 51	1 27 45	1 30 44	1 33 45	1 36 52	1 39 59	1 43 11	1 46 26	1 49 45	1 53 6
6	1 10 3	1 12 42	1 15 21	1 18 6	1 20 52	1 23 41	1 26 33	1 29 29	1 32 27	1 35 32	1 38 36	1 41 45	1 44 57	1 48 13	1 51 31
7	1 9 7	1 11 43	1 14 20	1 17 2	1 19 46	1 22 33	1 25 23	1 28 16	1 31 12	1 34 14	1 37 15	1 40 21	1 43 30	1 46 43	1 49 58
8	1 8 13	1 10 46	1 13 21	1 16 0	1 18 42	1 21 27	1 24 15	1 27 5	1 29 59	1 32 58	1 35 57	1 39 0	1 42 6	1 45 16	1 48 28
9	1 7 20	1 9 50	1 12 23	1 15 0	1 17 40	1 20 22	1 23 8	1 25 56	1 28 48	1 31 44	1 34 41	1 37 41	1 40 44	1 43 51	1 47 1
10	1 6 28	1 8 56	1 11 27	1 14 1	1 16 39	1 19 19	1 22 2	1 24 48	1 27 38	1 30 31	1 33 26	1 36 24	1 39 24	1 42 28	1 45 36
11	1 5 37	1 8 3	1 10 32	1 13 3	1 15 39	1 18 17	1 20 57	1 23 41	1 26 29	1 29 19	1 32 12	1 35 8	1 38 5	1 41 6	1 44 12
12	1 4 46	1 7 10	1 9 37	1 12 5	1 14 39	1 17 15	1 19 53	1 22 35	1 25 21	1 28 8	1 30 59	1 33 53	1 36 47	1 39 45	1 42 49
13	1 3 56	1 6 18	1 8 42	1 11 8	1 13 40	1 16 14	1 18 50	1 21 30	1 24 14	1 26 58	1 29 47	1 32 39	1 35 30	1 38 25	1 41 27
14	1 3 6	1 5 26	1 7 48	1 10 12	1 12 42	1 15 14	1 17 48	1 20 26	1 23 7	1 25 49	1 28 36	1 31 25	1 34 14	1 37 7	1 40 6
15	1 2 16	1 4 34	1 6 54	1 9 16	1 11 44	1 14 14	1 16 46	1 19 22	1 22 1	1 24 41	1 27 25	1 30 12	1 32 59	1 35 50	1 38 46
16	1 1 27	1 3 43	1 6 1	1 8 21	1 10 47	1 13 15	1 15 45	1 18 19	1 20 55	1 23 33	1 26 15	1 29 0	1 31 45	1 34 34	1 37 27
17	1 0 38	1 2 52	1 5 8	1 7 26	1 9 50	1 12 16	1 14 44	1 17 16	1 19 50	1 22 26	1 25 6	1 27 49	1 30 32	1 33 19	1 36 9
18	0 59 49	1 2 1	1 4 16	1 6 32	1 8 54	1 11 18	1 13 44	1 16 14	1 18 46	1 21 20	1 23 58	1 26 38	1 29 20	1 32 5	1 34 52
19	0 59 1	1 1 11	1 3 24	1 5 39	1 7 59	1 10 21	1 12 45	1 15 13	1 17 43	1 20 15	1 22 50	1 25 28	1 28 8	1 30 51	1 33 36
20	0 58 13	1 0 21	1 2 32	1 4 46	1 7 4	1 9 24	1 11 46	1 14 12	1 16 40	1 19 10	1 21 43	1 24 19	1 26 57	1 29 38	1 32 21
21	0 57 25	0 59 32	1 1 41	1 3 54	1 6 9	1 8 27	1 10 47	1 13 11	1 15 37	1 18 5	1 20 36	1 23 10	1 25 46	1 28 25	1 31 6
22	0 56 38	0 58 43	1 0 51	1 3 2	1 5 15	1 7 31	1 9 49	1 12 11	1 14 35	1 17 1	1 19 30	1 22 2	1 24 36	1 27 12	1 29 52
23	0 55 52	0 57 55	1 0 2	1 2 11	1 4 22	1 6 36	1 8 52	1 11 11	1 13 33	1 15 58	1 18 25	1 20 54	1 23 26	1 26 0	1 28 39

LATITUDE 47° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 24	0 10 29	0 10 38	0 10 51	0 11 8	0 11 28	0 11 52	0 12 19	0 12 50	0 13 25	0 14 3	0 14 45	0 15 31	0 16 20	0 17 13
1	0 10 26	0 10 31	0 10 40	0 10 54	0 11 11	0 11 30	0 11 55	0 12 23	0 12 54	0 13 30	0 14 9	0 14 51	0 15 38	0 16 28	0 17 22
2	0 10 28	0 10 33	0 10 42	0 10 57	0 11 14	0 11 33	0 11 58	0 12 27	0 12 58	0 13 35	0 14 15	0 14 58	0 15 45	0 16 36	0 17 31
3	0 10 30	0 10 35	0 10 44	0 11 0	0 11 17	0 11 36	0 12 1	0 12 31	0 13 2	0 13 40	0 14 21	0 15 5	0 15 53	0 16 44	0 17 40
4	0 10 32	0 10 37	0 10 46	0 11 2	0 11 20	0 11 39	0 12 4	0 12 35	0 13 6	0 13 45	0 14 27	0 15 12	0 16 1	0 16 52	0 17 49
5	0 10 34	0 10 39	0 10 48	0 11 4	0 11 23	0 11 42	0 12 7	0 12 39	0 13 11	0 13 50	0 14 33	0 15 19	0 16 9	0 17 1	0 17 59
6	0 10 36	0 10 41	0 10 50	0 11 6	0 11 25	0 11 45	0 12 10	0 12 43	0 13 16	0 13 55	0 14 39	0 15 26	0 16 17	0 17 10	0 18 9
7	0 10 38	0 10 43	0 10 52	0 11 8	0 11 27	0 11 48	0 12 14	0 12 47	0 13 21	0 14 0	0 14 45	0 15 33	0 16 25	0 17 19	0 18 19
8	0 10 39	0 10 45	0 10 54	0 11 10	0 11 29	0 11 51	0 12 18	0 12 51	0 13 26	0 14 6	0 14 51	0 15 40	0 16 33	0 17 28	0 18 30
9	0 10 40	0 10 46	0 10 56	0 11 12	0 11 31	0 11 54	0 12 22	0 12 55	0 13 31	0 14 12	0 14 57	0 15 47	0 16 41	0 17 38	0 18 41
10	0 10 41	0 10 47	0 10 58	0 11 14	0 11 33	0 11 57	0 12 26	0 12 59	0 13 36	0 14 18	0 15 4	0 15 54	0 16 49	0 17 48	0 18 52
11	0 10 42	0 10 49	0 11 0	0 11 17	0 11 35	0 12 0	0 12 30	0 13 4	0 13 41	0 14 24	0 15 11	0 16 2	0 16 58	0 17 58	0 19 3
12	0 10 43	0 10 51	0 11 2	0 11 20	0 11 37	0 12 3	0 12 34	0 13 9	0 13 46	0 14 30	0 15 18	0 16 10	0 17 7	0 18 8	0 19 14
13	0 10 44	0 10 53	0 11 4	0 11 22	0 11 40	0 12 6	0 12 38	0 13 14	0 13 51	0 14 36	0 15 25	0 16 19	0 17 17	0 18 19	0 19 26
14	0 10 45	0 10 55	0 11 6	0 11 24	0 11 43	0 12 9	0 12 42	0 13 19	0 13 57	0 14 43	0 15 33	0 16 28	0 17 27	0 18 30	0 19 39
15	0 10 46	0 10 57	0 11 8	0 11 26	0 11 46	0 12 12	0 12 46	0 13 24	0 14 3	0 14 50	0 15 41	0 16 37	0 17 37	0 18 42	0 19 52
16	0 10 47	0 10 59	0 11 10	0 11 28	0 11 49	0 12 15	0 12 50	0 13 29	0 14 9	0 14 57	0 15 49	0 16 47	0 17 48	0 18 55	0 20 6
17	0 10 48	0 11 0	0 11 12	0 11 30	0 11 52	0 12 19	0 12 54	0 13 34	0 14 15	0 15 5	0 15 58	0 16 57	0 18 0	0 19 8	0 20 21
18	0 10 50	0 11 1	0 11 14	0 11 32	0 11 55	0 12 23	0 12 58	0 13 39	0 14 22	0 15 13	0 16 7	0 17 8	0 18 13	0 19 22	0 20 37
19	0 10 52	0 11 2	0 11 15	0 11 34	0 11 58	0 12 27	0 13 2	0 13 44	0 14 29	0 15 21	0 16 17	0 17 19	0 18 26	0 19 37	0 20 54
20	0 10 54	0 11 3	0 11 16	0 11 36	0 12 1	0 12 31	0 13 7	0 13 49	0 14 36	0 15 29	0 16 27	0 17 31	0 18 40	0 19 53	0 21 12
21	0 10 56	0 11 4	0 11 18	0 11 38	0 12 4	0 12 35	0 13 12	0 13 55	0 14 44	0 15 38	0 16 38	0 17 43	0 18 54	0 20 10	0 21 31
22	0 10 57	0 11 5	0 11 20	0 11 40	0 12 7	0 12 39	0 13 17	0 14 2	0 14 52	0 15 48	0 16 50	0 17 56	0 19 9	0 20 28	0 21 51
23	0 10 58	0 11 7	0 11 22	0 11 43	0 12 10	0 12 44	0 13 23	0 14 9	0 15 0	0 15 58	0 17 2	0 18 10	0 19 25	0 20 46	0 22 13

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 24	0 10 29	0 10 38	0 10 51	0 11 8	0 11 28	0 11 52	0 12 19	0 12 50	0 13 25	0 14 3	0 14 45	0 15 31	0 16 20	0 17 13
1	0 10 22	0 10 27	0 10 36	0 10 49	0 11 5	0 11 25	0 11 49	0 12 15	0 12 46	0 13 20	0 13 58	0 14 38	0 15 25	0 16 12	0 17 4
2	0 10 20	0 10 25	0 10 34	0 10 47	0 11 2	0 11 22	0 11 46	0 12 11	0 12 42	0 13 15	0 13 53	0 14 32	0 15 19	0 16 4	0 16 56
3	0 10 18	0 10 23	0 10 32	0 10 44	0 10 59	0 11 19	0 11 43	0 12 7	0 12 38	0 13 10	0 13 48	0 14 26	0 15 12	0 15 56	0 16 48
4	0 10 16	0 10 21	0 10 30	0 10 41	0 10 56	0 11 16	0 11 39	0 12 3	0 12 34	0 13 5	0 13 43	0 14 20	0 15 5	0 15 48	0 16 40
5	0 10 14	0 10 19	0 10 27	0 10 38	0 10 53	0 11 13	0 11 35	0 11 59	0 12 30	0 13 0	0 13 38	0 14 14	0 14 58	0 15 41	0 16 32
6	0 10 11	0 10 16	0 10 24	0 10 35	0 10 50	0 11 10	0 11 31	0 11 55	0 12 25	0 12 55	0 13 32	0 14 8	0 14 51	0 15 34	0 16 24
7	0 10 8	0 10 13	0 10 21	0 10 32	0 10 47	0 11 6	0 11 27	0 11 51	0 12 20	0 12 50	0 13 26	0 14 2	0 14 44	0 15 27	0 16 16
8	0 10 5	0 10 10	0 10 18	0 10 29	0 10 44	0 11 2	0 11 23	0 11 47	0 12 15	0 12 45	0 13 20	0 13 56	0 14 37	0 15 20	0 16 8
9	0 10 2	0 10 7	0 10 15	0 10 26	0 10 41	0 10 58	0 11 19	0 11 43	0 12 10	0 12 40	0 13 14	0 13 50	0 14 30	0 15 13	0 16 0
10	0 9 59	0 10 4	0 10 12	0 10 23	0 10 37	0 10 54	0 11 15	0 11 38	0 12 5	0 12 35	0 13 8	0 13 44	0 14 23	0 15 6	0 15 52
11	0 9 56	0 10 1	0 10 9	0 10 20	0 10 33	0 10 50	0 11 11	0 11 33	0 12 0	0 12 30	0 13 2	0 13 38	0 14 16	0 14 59	0 15 44
12	0 9 53	0 9 58	0 10 6	0 10 17	0 10 29	0 10 46	0 11 7	0 11 28	0 11 55	0 12 25	0 12 56	0 13 32	0 14 9	0 14 52	0 15 36
13	0 9 50	0 9 54	0 10 3	0 10 14	0 10 25	0 10 42	0 11 3	0 11 23	0 11 50	0 12 20	0 12 50	0 13 26	0 14 2	0 14 44	0 15 28
14	0 9 46	0 9 50	0 9 59	0 10 10	0 10 21	0 10 38	0 10 58	0 11 18	0 11 45	0 12 15	0 12 44	0 13 19	0 13 55	0 14 36	0 15 20
15	0 9 42	0 9 46	0 9 55	0 10 6	0 10 17	0 10 34	0 10 53	0 11 13	0 11 40	0 12 9	0 12 38	0 13 12	0 13 48	0 14 28	0 15 12
16	0 9 38	0 9 42	0 9 51	0 10 2	0 10 13	0 10 30	0 10 48	0 11 8	0 11 35	0 12 3	0 12 32	0 13 5	0 13 41	0 14 20	0 15 4
17	0 9 34	0 9 38	0 9 47	0 9 58	0 10 9	0 10 25	0 10 43	0 11 3	0 11 29	0 11 57	0 12 26	0 12 58	0 13 34	0 14 12	0 14 55
18	0 9 30	0 9 34	0 9 43	0 9 53	0 10 5	0 10 20	0 10 38	0 10 58	0 11 23	0 11 51	0 12 20	0 12 51	0 13 27	0 14 4	0 14 46
19	0 9 26	0 9 30	0 9 38	0 9 48	0 10 0	0 10 15	0 10 33	0 10 53	0 11 17	0 11 44	0 12 13	0 12 44	0 13 20	0 13 56	0 14 37
20	0 9 22	0 9 26	0 9 33	0 9 42	0 9 55	0 10 10	0 10 28	0 10 48	0 11 11	0 11 37	0 12 6	0 12 37	0 13 12	0 13 48	0 14 28
21	0 9 17	0 9 21	0 9 27	0 9 36	0 9 49	0 10 4	0 10 22	0 10 41	0 11 4	0 11 30	0 11 58	0 12 29	0 13 3	0 13 39	0 14 18
22	0 9 11	0 9 15	0 9 21	0 9 30	0 9 42	0 9 57	0 10 15	0 10 34	0 10 57	0 11 22	0 11 50	0 12 20	0 12 54	0 13 30	0 14 8
23	0 9 4	0 9 8	0 9 14	0 9 23	0 9 35	0 9 50	0 10 7	0 10 26	0 10 49	0 11 14	0 11 41	0 12 11	0 12 44	0 13 20	0 13 58

LATITUDE 47° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 18 10	0 19 10	0 20 14	0 21 21	0 22 33	0 23 47	0 25 6	0 26 28	0 27 53	0 29 22	0 30 55	0 32 31	0 34 11	0 35 54	0 37 41
1	0 18 20	0 19 21	0 20 26	0 21 34	0 22 47	0 24 3	0 25 23	0 26 46	0 28 12	0 29 42	0 31 16	0 32 53	0 34 34	0 36 19	0 38 8
2	0 18 30	0 19 32	0 20 38	0 21 47	0 23 1	0 24 20	0 25 41	0 27 5	0 28 32	0 30 3	0 31 38	0 33 16	0 34 58	0 36 45	0 38 36
3	0 18 40	0 19 44	0 20 51	0 22 1	0 23 16	0 24 37	0 25 59	0 27 24	0 28 52	0 30 25	0 32 1	0 33 41	0 35 24	0 37 13	0 39 6
4	0 18 51	0 19 56	0 21 4	0 22 15	0 23 31	0 24 54	0 26 17	0 27 44	0 29 13	0 30 48	0 32 26	0 34 8	0 35 52	0 37 43	0 39 38
5	0 19 2	0 20 8	0 21 17	0 22 30	0 23 47	0 25 12	0 26 36	0 28 4	0 29 35	0 31 12	0 32 52	0 34 36	0 36 22	0 38 15	0 40 12
6	0 19 13	0 20 20	0 21 31	0 22 45	0 24 3	0 25 30	0 26 55	0 28 25	0 29 58	0 31 37	0 33 19	0 35 5	0 36 53	0 38 48	0 40 47
7	0 19 24	0 20 33	0 21 45	0 23 0	0 24 20	0 25 48	0 27 15	0 28 47	0 30 22	0 32 3	0 33 47	0 35 35	0 37 24	0 39 21	0 41 23
8	0 19 36	0 20 46	0 21 59	0 23 16	0 24 38	0 26 7	0 27 35	0 29 9	0 30 46	0 32 29	0 34 15	0 36 5	0 37 56	0 39 55	0 41 59
9	0 19 48	0 20 59	0 22 14	0 23 33	0 24 56	0 26 26	0 27 56	0 29 32	0 31 11	0 32 56	0 34 44	0 36 36	0 38 30	0 40 31	0 42 37
10	0 20 0	0 21 12	0 22 29	0 23 50	0 25 15	0 26 45	0 28 18	0 29 56	0 31 37	0 33 24	0 35 14	0 37 8	0 39 6	0 41 9	0 43 17
11	0 20 12	0 21 25	0 22 44	0 24 7	0 25 34	0 27 5	0 28 41	0 30 21	0 32 4	0 33 53	0 35 46	0 37 42	0 39 43	0 41 48	0 43 59
12	0 20 24	0 21 39	0 23 0	0 24 25	0 25 54	0 27 26	0 29 5	0 30 47	0 32 32	0 34 23	0 36 19	0 38 18	0 40 22	0 42 29	0 44 43
13	0 20 37	0 21 54	0 23 17	0 24 44	0 26 15	0 27 47	0 29 29	0 31 13	0 33 1	0 34 54	0 36 53	0 38 55	0 41 2	0 43 12	0 45 29
14	0 20 51	0 22 10	0 23 35	0 25 4	0 26 37	0 28 10	0 29 54	0 31 41	0 33 32	0 35 28	0 37 29	0 39 34	0 41 44	0 43 57	0 46 17
15	0 21 6	0 22 27	0 23 54	0 25 25	0 27 0	0 28 35	0 30 21	0 32 11	0 34 5	0 36 4	0 38 8	0 40 15	0 42 28	0 44 44	0 47 7
16	0 21 22	0 22 45	0 24 14	0 25 47	0 27 24	0 29 2	0 30 50	0 32 43	0 34 40	0 36 42	0 38 48	0 40 58	0 43 14	0 45 33	0 48 0
17	0 21 39	0 23 4	0 24 35	0 26 10	0 27 49	0 29 31	0 31 21	0 33 17	0 35 17	0 37 22	0 39 30	0 41 43	0 44 2	0 46 24	0 48 55
18	0 21 57	0 23 24	0 24 57	0 26 34	0 28 15	0 30 1	0 31 53	0 33 52	0 35 55	0 38 3	0 40 14	0 42 30	0 44 52	0 47 17	0 49 52
19	0 22 16	0 23 45	0 25 20	0 26 59	0 28 43	0 30 32	0 32 27	0 34 29	0 36 35	0 38 46	0 41 0	0 43 19	0 45 45	0 48 13	0 50 52
20	0 22 37	0 24 8	0 25 44	0 27 25	0 29 12	0 31 5	0 33 3	0 35 8	0 37 18	0 39 32	0 41 49	0 44 12	0 46 40	0 49 13	0 51 56
21	0 22 59	0 24 33	0 26 10	0 27 54	0 29 44	0 31 41	0 33 42	0 35 50	0 38 3	0 40 20	0 42 42	0 45 10	0 47 42	0 50 20	0 53 6
22	0 23 22	0 24 59	0 26 39	0 28 26	0 30 19	0 32 20	0 34 24	0 36 35	0 38 51	0 41 11	0 43 39	0 46 12	0 48 48	0 51 31	0 54 21
23	0 23 46	0 25 25	0 27 10	0 29 1	0 30 58	0 33 2	0 35 11	0 37 25	0 39 43	0 42 7	0 44 40	0 47 18	0 50 0	0 52 48	0 55 41

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 18 10	0 19 10	0 20 14	0 21 21	0 22 33	0 23 47	0 25 6	0 26 28	0 27 53	0 29 22	0 30 55	0 32 31	0 34 11	0 35 54	0 37 41
1	0 18 1	0 19 0	0 20 3	0 21 9	0 22 20	0 23 33	0 24 51	0 26 12	0 27 36	0 29 3	0 30 35	0 32 10	0 33 48	0 35 28	0 37 14
2	0 17 52	0 18 50	0 19 52	0 20 57	0 22 7	0 23 19	0 24 36	0 25 56	0 27 19	0 28 44	0 30 15	0 31 49	0 33 25	0 35 2	0 36 47
3	0 17 43	0 18 40	0 19 41	0 20 45	0 21 54	0 23 5	0 24 21	0 25 40	0 27 2	0 28 26	0 29 55	0 31 28	0 33 2	0 34 37	0 36 21
4	0 17 34	0 18 30	0 19 30	0 20 33	0 21 41	0 22 51	0 24 6	0 25 24	0 26 45	0 28 8	0 29 35	0 31 7	0 32 39	0 34 13	0 35 56
5	0 17 25	0 18 20	0 19 19	0 20 21	0 21 28	0 22 37	0 23 51	0 25 8	0 26 28	0 27 50	0 29 15	0 30 46	0 32 17	0 33 49	0 35 31
6	0 17 16	0 18 10	0 19 8	0 20 9	0 21 15	0 22 23	0 23 36	0 24 52	0 26 11	0 27 32	0 28 56	0 30 25	0 31 55	0 33 26	0 35 6
7	0 17 7	0 18 0	0 18 57	0 19 58	0 21 3	0 22 10	0 23 21	0 24 36	0 25 54	0 27 14	0 28 37	0 30 4	0 31 33	0 33 3	0 34 42
8	0 16 58	0 17 50	0 18 47	0 19 47	0 20 51	0 21 57	0 23 7	0 24 20	0 25 37	0 26 56	0 28 18	0 29 44	0 31 12	0 32 41	0 34 18
9	0 16 49	0 17 41	0 18 37	0 19 36	0 20 39	0 21 44	0 22 53	0 24 4	0 25 20	0 26 38	0 27 59	0 29 24	0 30 51	0 32 20	0 33 55
10	0 16 40	0 17 32	0 18 27	0 19 25	0 20 27	0 21 31	0 22 39	0 23 49	0 25 3	0 26 20	0 27 40	0 29 4	0 30 30	0 31 59	0 33 32
11	0 16 32	0 17 23	0 18 17	0 19 14	0 20 15	0 21 18	0 22 25	0 23 34	0 24 47	0 26 3	0 27 22	0 28 45	0 30 10	0 31 38	0 33 9
12	0 16 23	0 17 14	0 18 7	0 19 3	0 20 3	0 21 5	0 22 11	0 23 19	0 24 31	0 25 46	0 27 4	0 28 26	0 29 50	0 31 17	0 32 46
13	0 16 14	0 17 5	0 17 57	0 18 52	0 19 51	0 20 52	0 21 57	0 23 4	0 24 15	0 25 29	0 26 46	0 28 7	0 29 30	0 30 56	0 32 24
14	0 16 5	0 16 56	0 17 47	0 18 41	0 19 39	0 20 39	0 21 43	0 22 49	0 23 59	0 25 12	0 26 28	0 27 48	0 29 10	0 30 35	0 32 2
15	0 15 56	0 16 46	0 17 37	0 18 30	0 19 27	0 20 27	0 21 29	0 22 34	0 23 43	0 24 55	0 26 10	0 27 29	0 28 50	0 30 14	0 31 40
16	0 15 47	0 16 36	0 17 27	0 18 19	0 19 15	0 20 15	0 21 15	0 22 19	0 23 28	0 24 38	0 25 52	0 27 10	0 28 30	0 29 53	0 31 18
17	0 15 38	0 16 26	0 17 16	0 18 8	0 19 3	0 20 2	0 21 1	0 22 5	0 23 13	0 24 22	0 25 35	0 26 51	0 28 10	0 29 32	0 30 56
18	0 15 29	0 16 16	0 17 5	0 17 57	0 18 51	0 19 49	0 20 48	0 21 51	0 22 58	0 24 6	0 25 18	0 26 32	0 27 50	0 29 11	0 30 34
19	0 15 20	0 16 6	0 16 54	0 17 46	0 18 39	0 19 36	0 20 35	0 21 37	0 22 43	0 23 50	0 25 1	0 26 14	0 27 30	0 28 50	0 30 12
20	0 15 11	0 15 56	0 16 43	0 17 34	0 18 27	0 19 23	0 20 22	0 21 23	0 22 28	0 23 34	0 24 44	0 25 56	0 27 11	0 28 29	0 29 50
21	0 15 1	0 15 45	0 16 31	0 17 22	0 18 14	0 19 9	0 20 8	0 21 8	0 22 12	0 23 17	0 24 26	0 25 37	0 26 51	0 28 8	0 29 28
22	0 14 50	0 15 34	0 16 19	0 17 9	0 18 1	0 18 55	0 19 53	0 20 52	0 21 55	0 23 0	0 24 8	0 25 18	0 26 31	0 27 47	0 29 5
23	0 14 38	0 15 22	0 16 7	0 16 56	0 17 47	0 18 41	0 19 37	0 20 36	0 21 38	0 22 42	0 23 49	0 24 58	0 26 10	0 27 25	0 28 42

LATITUDE 47° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 39 32	0 41 26	0 43 23	0 45 25	0 47 29	0 49 37	0 51 49	0 54 4	0 56 23	0 58 45	1 1 11	1 3 40	1 6 12	1 8 48	1 11 28
1	0 40 1	0 41 57	0 43 57	0 46 1	0 48 7	0 50 15	0 52 30	0 54 48	0 57 9	0 59 34	1 2 2	1 4 33	1 7 8	1 9 47	1 12 29
2	0 40 31	0 42 29	0 44 32	0 46 38	0 48 46	0 50 56	0 53 13	0 55 34	0 57 57	1 0 26	1 2 55	1 5 29	1 8 6	1 10 48	1 13 32
3	0 41 3	0 43 3	0 45 8	0 47 16	0 49 27	0 51 39	0 53 58	0 56 22	0 58 47	1 1 21	1 3 52	1 6 28	1 9 7	1 11 52	1 14 37
4	0 41 37	0 43 39	0 45 46	0 47 56	0 50 9	0 52 24	0 54 44	0 57 11	0 59 38	1 2 17	1 4 50	1 7 29	1 10 11	1 12 59	1 15 44
5	0 42 13	0 44 17	0 46 25	0 48 37	0 50 52	0 53 10	0 55 32	0 58 2	1 0 31	1 3 14	1 5 50	1 8 32	1 11 17	1 14 8	1 16 54
6	0 42 50	0 44 56	0 47 6	0 49 20	0 51 37	0 53 58	0 56 23	0 58 55	1 1 27	1 4 12	1 6 51	1 9 36	1 12 24	1 15 18	1 18 6
7	0 43 28	0 45 36	0 47 48	0 50 4	0 52 24	0 54 48	0 57 16	0 59 50	1 2 25	1 5 10	1 7 52	1 10 40	1 13 32	1 16 29	1 19 21
8	0 44 7	0 46 18	0 48 32	0 50 50	0 53 13	0 55 40	0 58 11	1 0 47	1 3 25	1 6 10	1 8 55	1 11 46	1 14 41	1 17 41	1 20 39
9	0 44 47	0 47 1	0 49 18	0 51 38	0 54 4	0 56 34	0 59 8	1 1 46	1 4 27	1 7 13	1 10 1	1 12 55	1 15 53	1 18 56	1 22 0
10	0 45 29	0 47 46	0 50 6	0 52 29	0 54 58	0 57 31	1 0 8	1 2 48	1 5 32	1 8 19	1 11 11	1 14 8	1 17 9	1 20 15	1 23 24
11	0 46 14	0 48 34	0 50 57	0 53 23	0 55 55	0 58 30	1 1 10	1 3 53	1 6 40	1 9 28	1 12 23	1 15 24	1 18 29	1 21 39	1 24 52
12	0 47 1	0 49 24	0 51 50	0 54 19	0 56 54	0 59 31	1 2 14	1 5 0	1 7 51	1 10 40	1 13 38	1 16 44	1 19 53	1 23 7	1 26 24
13	0 47 50	0 50 16	0 52 45	0 55 17	0 57 55	1 0 34	1 3 21	1 6 11	1 9 6	1 11 56	1 14 57	1 18 8	1 21 21	1 24 39	1 28 0
14	0 48 41	0 51 10	0 53 42	0 56 17	0 58 59	1 1 40	1 4 31	1 7 25	1 10 24	1 13 16	1 16 21	1 19 36	1 22 53	1 26 15	1 29 40
15	0 49 34	0 52 6	0 54 41	0 57 20	1 0 6	1 2 50	1 5 45	1 8 43	1 11 46	1 14 41	1 17 50	1 21 9	1 24 29	1 27 56	1 31 25
16	0 50 30	0 53 5	0 55 40	0 58 26	1 1 16	1 4 3	1 7 2	1 10 4	1 13 11	1 16 11	1 19 24	1 22 47	1 26 11	1 29 42	1 33 15
17	0 51 28	0 54 6	0 56 48	0 59 35	1 2 29	1 5 20	1 8 23	1 11 29	1 14 40	1 17 45	1 21 52	1 24 30	1 27 59	1 31 34	1 35 11
18	0 52 29	0 55 10	0 57 56	1 0 47	1 3 45	1 6 42	1 9 49	1 12 59	1 16 14	1 19 25	1 22 47	1 26 20	1 29 54	1 33 33	1 37 15
19	0 53 34	0 56 18	0 59 8	1 2 3	1 5 5	1 8 9	1 11 20	1 14 34	1 17 53	1 21 12	1 24 39	1 28 17	1 31 56	1 35 40	1 39 27
20	0 54 41	0 57 30	1 0 25	1 3 24	1 6 30	1 9 42	1 12 57	1 16 15	1 19 38	1 23 6	1 26 41	1 30 21	1 34 6	1 37 55	1 41 47
21	0 55 55	0 58 49	1 1 49	1 4 53	1 8 4	1 11 21	1 14 41	1 18 5	1 21 34	1 25 8	1 28 48	1 32 33	1 36 23	1 40 17	1 44 16
22	0 57 15	1 0 14	1 3 19	1 6 29	1 9 45	1 13 7	1 16 32	1 20 2	1 23 37	1 27 17	1 31 2	1 34 53	1 38 53	1 42 49	1 46 54
23	0 58 40	1 1 45	1 4 56	1 8 12	1 11 33	1 15 0	1 18 31	1 22 7	1 25 48	1 29 34	1 33 25	1 37 22	1 41 24	1 45 30	1 49 43

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 39 32	0 41 26	0 43 23	0 45 25	0 47 29	0 49 37	0 51 49	0 54 4	0 56 23	0 58 45	1 1 11	1 3 40	1 6 12	1 8 48	1 11 28
1	0 39 4	0 40 56	0 42 51	0 44 51	0 46 54	0 48 59	0 51 9	0 53 21	0 55 38	0 57 58	1 0 22	1 2 48	1 5 15	1 7 48	1 10 26
2	0 38 36	0 40 26	0 42 19	0 44 17	0 46 19	0 48 22	0 50 30	0 52 39	0 54 54	0 57 12	0 59 34	1 1 57	1 4 20	1 6 51	1 9 27
3	0 38 8	0 39 56	0 41 48	0 43 44	0 45 44	0 47 45	0 49 52	0 51 58	0 54 11	0 56 27	0 58 47	1 1 7	1 3 27	1 5 56	1 8 30
4	0 37 41	0 39 27	0 41 17	0 43 11	0 45 10	0 47 8	0 49 14	0 51 17	0 53 28	0 55 42	0 58 0	1 0 18	1 2 36	1 5 3	1 7 35
5	0 37 15	0 38 59	0 40 47	0 42 39	0 44 36	0 46 32	0 48 36	0 50 37	0 52 46	0 54 58	0 57 14	0 59 30	1 1 47	1 4 12	1 6 42
6	0 36 49	0 38 31	0 40 17	0 42 8	0 44 3	0 45 57	0 47 59	0 49 59	0 52 6	0 54 15	0 56 29	0 58 43	1 1 0	1 3 23	1 5 51
7	0 36 23	0 38 4	0 39 49	0 41 37	0 43 30	0 45 23	0 47 23	0 49 22	0 51 27	0 53 33	0 55 45	0 57 58	1 0 14	1 2 35	1 5 1
8	0 35 57	0 37 37	0 39 20	0 41 7	0 42 58	0 44 50	0 46 48	0 48 46	0 50 49	0 52 53	0 55 3	0 57 15	0 59 30	1 1 49	1 4 12
9	0 35 32	0 37 11	0 38 53	0 40 38	0 42 27	0 44 18	0 46 14	0 48 11	0 50 12	0 52 15	0 54 23	0 56 33	0 58 47	1 1 4	1 3 24
10	0 35 7	0 36 45	0 38 26	0 40 10	0 41 57	0 43 47	0 45 41	0 47 37	0 49 36	0 51 38	0 53 43	0 55 52	0 58 5	1 0 20	1 2 38
11	0 34 43	0 36 20	0 38 0	0 39 42	0 41 28	0 43 17	0 45 9	0 47 4	0 49 1	0 51 2	0 53 5	0 55 12	0 57 24	0 59 37	1 1 53
12	0 34 19	0 35 55	0 37 34	0 39 15	0 40 59	0 42 47	0 44 37	0 46 31	0 48 26	0 50 26	0 52 27	0 54 33	0 56 43	0 58 54	1 1 8
13	0 33 56	0 35 30	0 37 8	0 38 48	0 40 30	0 42 17	0 44 5	0 45 58	0 47 51	0 49 50	0 51 49	0 53 54	0 56 2	0 58 11	1 0 23
14	0 33 32	0 35 5	0 36 42	0 38 21	0 40 1	0 41 47	0 43 34	0 45 25	0 47 17	0 49 14	0 51 11	0 53 15	0 55 21	0 57 28	0 59 38
15	0 33 9	0 34 40	0 36 16	0 37 54	0 39 33	0 41 17	0 43 3	0 44 52	0 46 43	0 48 38	0 50 34	0 52 36	0 54 40	0 56 45	0 58 53
16	0 32 46	0 34 15	0 35 50	0 37 27	0 39 5	0 40 47	0 42 32	0 44 19	0 46 9	0 48 2	0 49 57	0 51 57	0 53 59	0 56 2	0 58 8
17	0 32 23	0 33 51	0 35 24	0 37 0	0 38 37	0 40 17	0 42 1	0 43 46	0 45 35	0 47 26	0 49 20	0 51 18	0 53 18	0 55 19	0 57 24
18	0 32 0	0 33 27	0 34 58	0 36 33	0 38 9	0 39 47	0 41 30	0 43 13	0 45 1	0 46 50	0 48 43	0 50 39	0 52 37	0 54 36	0 56 40
19	0 31 37	0 33 3	0 34 32	0 36 6	0 37 41	0 39 18	0 40 59	0 42 41	0 44 27	0 46 14	0 48 6	0 50 0	0 51 56	0 53 54	0 55 56
20	0 31 13	0 32 39	0 34 7	0 35 39	0 37 13	0 38 49	0 40 28	0 42 9	0 43 53	0 45 39	0 47 29	0 49 21	0 51 15	0 53 12	0 55 12
21	0 30 50	0 32 14	0 33 41	0 35 12	0 36 45	0 38 20	0 39 57	0 41 37	0 43 20	0 45 4	0 46 52	0 48 43	0 50 35	0 52 31	0 54 29
22	0 30 26	0 31 49	0 33 15	0 34 45	0 36 16	0 37 50	0 39 26	0 41 5	0 42 47	0 44 30	0 46 16	0 48 5	0 49 56	0 51 50	0 53 47
23	0 30 2	0 31 24	0 32 49	0 34 17	0 35 47	0 37 20	0 38 55	0 40 33	0 42 14	0 43 56	0 45 40	0 47 28	0 49 18	0 51 10	0 53 5

LATITUDE 47° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 14 10	1 16 56	1 19 47	1 22 39	1 25 35	1 28 35	1 31 38	1 34 45	1 37 54	1 41 8	1 44 24	1 47 44	1 51 7	1 54 33	1 58 2
1	1 15 14	1 18 3	1 20 57	1 23 51	1 26 50	1 29 53	1 33 1	1 36 11	1 39 23	1 42 40	1 45 59	1 49 22	1 52 47	1 56 16	1 59 48
2	1 16 20	1 19 12	1 22 9	1 25 6	1 28 8	1 31 14	1 34 26	1 37 39	1 40 54	1 44 14	1 47 35	1 51 2	1 54 29	1 58 1	2 1 36
3	1 17 28	1 20 23	1 23 23	1 26 23	1 29 28	1 32 37	1 35 53	1 39 9	1 42 26	1 45 50	1 49 14	1 52 44	1 56 14	1 59 49	2 3 27
4	1 18 38	1 21 36	1 24 39	1 27 42	1 30 50	1 34 2	1 37 22	1 40 41	1 44 1	1 47 28	1 50 56	1 54 29	1 58 2	2 1 40	2 5 21
5	1 19 51	1 22 51	1 25 57	1 29 3	1 32 14	1 35 29	1 38 53	1 42 15	1 45 39	1 49 9	1 52 41	1 56 17	1 59 53	2 3 34	2 7 19
6	1 21 6	1 24 8	1 27 17	1 30 26	1 33 41	1 36 59	1 40 27	1 43 52	1 47 20	1 50 53	1 54 29	1 58 8	2 1 48	2 5 32	2 9 21
7	1 22 24	1 25 28	1 28 40	1 31 53	1 35 11	1 38 32	1 42 4	1 45 32	1 49 4	1 52 40	1 56 20	2 0 3	2 3 47	2 7 35	2 11 28
8	1 23 45	1 26 52	1 30 7	1 33 24	1 36 45	1 40 9	1 43 44	1 47 15	1 50 51	1 54 31	1 58 15	2 2 2	2 5 50	2 9 42	2 13 39
9	1 25 9	1 28 20	1 31 38	1 34 59	1 38 23	1 41 50	1 45 27	1 49 2	1 52 42	1 56 26	2 0 14	2 4 5	2 7 58	2 11 54	2 15 55
10	1 26 36	1 29 52	1 33-13	1 36 38	1 40 7	1 43 38	1 47 13	1 50 53	1 54 38	1 58 26	2 2 18	2 6 13	2 10 12	2 14 13	2 18 18
11	1 28 8	1 31 28	1 34 53	1 38 22	1 41 55	1 45 31	1 49 4	1 52 49	1 56 39	2 0 32	2 4 28	2 8 28	2 12 32	2 16 38	2 20 47
12	1 29 44	1 33 8	1 36 37	1 40 10	1 43 47	1 47 28	1 51 0	1 54 50	1 58 45	2 2 43	2 6 44	2 10 49	2 14 58	2 19 9	2 23 23
13	1 31 24	1 34 52	1 38 25	1 42 2	1 45 43	1 49 29	1 53 3	1 56 57	2 0 57	2 5 0	2 9 6	2 13 16	2 17 30	2 21 47	2 26 6
14	1 33 8	1 36 41	1 40 18	1 43 59	1 47 45	1 51 36	1 55 13	1 59 12	2 3 17	2 7 25	2 11 36	2 15 51	2 20 10	2 24 32	2 28 56
15	1 34 56	1 38 34	1 42 16	1 46 2	1 49 53	1 53 49	1 57 31	2 1 35	2 5 45	2 9 58	2 14 14	2 18 34	2 22 58	2 27 25	2 31 54
16	1 36 50	1 40 33	1 44 20	1 48 11	1 52 7	1 56 8	1 59 57	2 4 6	2 8 21	2 12 39	2 17 0	2 21 25	2 25 54	2 30 26	2 35 1
17	1 38 51	1 42 39	1 46 31	1 50 27	1 54 28	1 58 34	2 2 31	2 6 45	2 11 5	2 15 28	2 19 54	2 24 24	2 28 58	2 33 36	2 38 17
18	1 41 0	1 44 53	1 48 50	1 52 51	1 56 57	2 1 8	2 5 14	2 9 33	2 13 58	2 18 26	2 22 57	2 27 32	2 32 12	2 36 56	2 41 43
19	1 43 17	1 47 15	1 51 17	1 55 23	1 59 34	2 3 50	2 8 6	2 12 31	2 17 1	2 21 34	2 26 10	2 30 51	2 35 37	2 40 27	2 45 20
20	1 45 43	1 49 46	1 53 54	1 58 5	2 2 21	2 6 42	2 11 8	2 15 39	2 20 15	2 24 54	2 29 35	2 34 22	2 39 14	2 44 10	2 49 10
21	1 48 19	1 52 28	1 56 42	2 1 0	2 5 22	2 9 46	2 14 21	2 18 58	2 23 40	2 28 26	2 33 14	2 38 8	2 43 6	2 48 9	2 53 16
22	1 51 5	1 55 20	1 59 40	2 4 5	2 8 34	2 13 4	2 17 46	2 22 30	2 27 18	2 32 11	2 37 6	2 42 7	2 47 12	2 52 22	2 57 36
23	1 54 1	1 58 23	2 2 50	2 7 22	2 11 58	2 16 39	2 21 25	2 26 16	2 31 11	2 36 10	2 41 14	2 46 22	2 51 34	2 56 51	3 2 13

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 14 10	1 16 56	1 19 47	1 22 39	1 25 35	1 28 35	1 31 38	1 34 45	1 37 54	1 41 8	1 44 24	1 47 44	1 51 7	1 54 33	1 58 2
1	1 13 6	1 15 49	1 18 36	1 21 26	1 24 20	1 27 18	1 30 19	1 33 24	1 36 30	1 39 42	1 42 55	1 46 12	1 49 32	1 52 55	1 56 22
2	1 12 5	1 14 45	1 17 29	1 20 17	1 23 9	1 26 4	1 29 3	1 32 6	1 35 9	1 38 18	1 41 28	1 44 42	1 47 59	1 51 19	1 54 44
3	1 11 6	1 13 44	1 16 25	1 19 11	1 22 1	1 24 53	1 27 49	1 30 50	1 33 50	1 36 56	1 40 3	1 43 14	1 46 28	1 49 46	1 53 8
4	1 10 9	1 12 45	1 15 23	1 18 7	1 20 55	1 23 44	1 26 37	1 29 35	1 32 33	1 35 36	1 38 41	1 41 49	1 45 0	1 48 15	1 51 36
5	1 9 14	1 11 48	1 14 24	1 17 5	1 19 51	1 22 37	1 25 27	1 28 22	1 31 18	1 34 18	1 37 21	1 40 26	1 43 34	1 46 47	1 50 6
6	1 8 21	1 10 53	1 13 27	1 16 5	1 18 48	1 21 31	1 24 19	1 27 11	1 30 5	1 33 2	1 36 3	1 39 5	1 42 10	1 45 20	1 48 39
7	1 7 29	1 9 59	1 12 31	1 15 6	1 17 46	1 20 27	1 23 13	1 26 2	1 28 54	1 31 48	1 34 47	1 37 46	1 40 48	1 43 55	1 47 13
8	1 6 38	1 9 6	1 11 36	1 14 9	1 16 46	1 19 25	1 22 9	1 24 55	1 27 45	1 30 37	1 33 33	1 36 29	1 39 29	1 42 33	1 45 49
9	1 5 48	1 8 14	1 10 42	1 13 13	1 15 48	1 18 25	1 21 6	1 23 50	1 26 38	1 29 28	1 32 21	1 35 15	1 38 12	1 41 14	1 44 28
10	1 4 59	1 7 23	1 9 49	1 12 18	1 14 51	1 17 26	1 20 5	1 22 47	1 25 32	1 28 20	1 31 11	1 34 3	1 36 57	1 39 56	1 42 59
11	1 4 11	1 6 33	1 8 57	1 11 24	1 13 55	1 16 28	1 19 5	1 21 45	1 24 27	1 27 13	1 30 2	1 32 52	1 35 43	1 38 40	1 41 40
12	1 3 24	1 5 44	1 8 5	1 10 31	1 13 0	1 15 31	1 18 6	1 20 44	1 23 23	1 26 7	1 28 54	1 31 42	1 34 30	1 37 25	1 40 22
13	1 2 37	1 4 56	1 7 14	1 9 38	1 12 5	1 14 34	1 17 7	1 19 43	1 22 20	1 25 2	1 27 46	1 30 32	1 33 18	1 36 11	1 39 5
14	1 1 51	1 4 8	1 6 23	1 8 46	1 11 11	1 13 38	1 16 9	1 18 42	1 21 18	1 23 57	1 26 39	1 29 23	1 32 7	1 34 58	1 37 49
15	1 1 5	1 3 20	1 5 33	1 7 54	1 10 17	1 12 42	1 15 11	1 17 42	1 20 16	1 22 53	1 25 32	1 28 14	1 30 57	1 33 45	1 36 34
16	1 0 19	1 2 32	1 4 43	1 7 2	1 9 23	1 11 46	1 14 13	1 16 42	1 19 14	1 21 49	1 24 26	1 27 6	1 29 47	1 32 32	1 35 20
17	0 59 33	1 1 44	1 3 54	1 6 11	1 8 30	1 10 51	1 13 16	1 15 43	1 18 13	1 20 46	1 23 21	1 25 59	1 28 38	1 31 21	1 34 7
18	0 58 47	1 0 56	1 3 5	1 5 20	1 7 37	1 9 56	1 12 19	1 14 44	1 17 12	1 19 43	1 22 16	1 24 52	1 27 30	1 30 10	1 32 55
19	0 58 1	1 0 8	1 2 17	1 4 30	1 6 45	1 9 2	1 11 23	1 13 46	1 16 12	1 18 41	1 21 12	1 23 46	1 26 22	1 29 0	1 31 43
20	0 57 15	0 59 21	1 1 29	1 3 40	1 5 53	1 8 9	1 10 27	1 12 48	1 15 12	1 17 39	1 20 8	1 22 40	1 25 14	1 27 51	1 30 31
21	0 56 30	0 58 34	1 0 41	1 2 50	1 5 2	1 7 16	1 9 32	1 11 51	1 14 13	1 16 38	1 19 5	1 21 35	1 24 7	1 26 42	1 29 20
22	0 55 46	0 57 48	0 59 53	1 2 1	1 4 11	1 6 24	1 8 38	1 10 55	1 13 15	1 15 38	1 18 3	1 20 31	1 23 1	1 25 34	1 28 10
23	0 55 3	0 57 3	0 59 6	1 1 12	1 3 21	1 5 32	1 7 45	1 10 0	1 12 18	1 14 39	1 17 2	1 19 28	1 21 56	1 24 27	1 27 0

LATITUDE 48° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 26	0 10 31	0 10 40	0 10 52	0 11 8	0 11 28	0 11 51	0 12 17	0 12 47	0 13 21	0 13 57	0 14 38	0 15 22	0 16 10	0 17 1
1	0 10 28	0 10 33	0 10 42	0 10 55	0 11 11	0 11 30	0 11 55	0 12 20	0 12 51	0 13 25	0 14 2	0 14 44	0 15 29	0 16 18	0 17 10
2	0 10 30	0 10 35	0 10 44	0 10 57	0 11 14	0 11 32	0 11 59	0 12 23	0 12 55	0 13 30	0 14 7	0 14 50	0 15 36	0 16 26	0 17 19
3	0 10 32	0 10 37	0 10 46	0 10 59	0 11 17	0 11 34	0 12 2	0 12 26	0 12 59	0 13 35	0 14 12	0 14 56	0 15 43	0 16 34	0 17 28
4	0 10 34	0 10 39	0 10 48	0 11 1	0 11 20	0 11 37	0 12 5	0 12 30	0 13 3	0 13 40	0 14 18	0 15 2	0 15 50	0 16 42	0 17 37
5	0 10 36	0 10 41	0 10 50	0 11 3	0 11 22	0 11 40	0 12 8	0 12 34	0 13 7	0 13 45	0 14 24	0 15 8	0 15 57	0 16 50	0 17 46
6	0 10 38	0 10 43	0 10 52	0 11 5	0 11 24	0 11 43	0 12 11	0 12 38	0 13 11	0 13 50	0 14 30	0 15 14	0 16 3	0 16 58	0 17 55
7	0 10 39	0 10 45	0 10 54	0 11 7	0 11 26	0 11 46	0 12 14	0 12 42	0 13 15	0 13 55	0 14 36	0 15 21	0 16 11	0 17 6	0 18 4
8	0 10 40	0 10 46	0 10 56	0 11 9	0 11 28	0 11 49	0 12 17	0 12 46	0 13 20	0 14 0	0 14 42	0 15 28	0 16 19	0 17 14	0 18 13
9	0 10 41	0 10 47	0 10 57	0 11 11	0 11 30	0 11 52	0 12 20	0 12 50	0 13 25	0 14 5	0 14 48	0 15 35	0 16 27	0 17 23	0 18 23
10	0 10 42	0 10 48	0 10 58	0 11 13	0 11 32	0 11 55	0 12 23	0 12 54	0 13 30	0 14 10	0 14 54	0 15 42	0 16 35	0 17 32	0 18 33
11	0 10 43	0 10 49	0 10 59	0 11 15	0 11 34	0 11 58	0 12 26	0 12 58	0 13 35	0 14 15	0 15 0	0 15 49	0 16 43	0 17 42	0 18 44
12	0 10 44	0 10 50	0 11 0	0 11 17	0 11 36	0 12 1	0 12 29	0 13 2	0 13 40	0 14 20	0 15 6	0 15 56	0 16 52	0 17 52	0 18 55
13	0 10 45	0 10 51	0 11 2	0 11 19	0 11 38	0 12 4	0 12 33	0 13 6	0 13 45	0 14 26	0 15 13	0 16 4	0 17 1	0 18 2	0 19 7
14	0 10 46	0 10 52	0 11 4	0 11 21	0 11 40	0 12 7	0 12 37	0 13 11	0 13 50	0 14 32	0 15 20	0 16 12	0 17 10	0 18 13	0 19 19
15	0 10 47	0 10 53	0 11 6	0 11 23	0 11 43	0 12 10	0 12 41	0 13 16	0 13 56	0 14 38	0 15 27	0 16 20	0 17 20	0 18 24	0 19 32
16	0 10 48	0 10 55	0 11 8	0 11 25	0 11 46	0 12 13	0 12 45	0 13 21	0 14 2	0 14 45	0 15 35	0 16 29	0 17 30	0 18 36	0 19 45
17	0 10 49	0 10 57	0 11 10	0 11 27	0 11 49	0 12 16	0 12 49	0 13 26	0 14 8	0 14 52	0 15 43	0 16 38	0 17 41	0 18 48	0 19 59
18	0 10 51	0 10 59	0 11 12	0 11 29	0 11 52	0 12 19	0 12 53	0 13 31	0 14 14	0 14 59	0 15 52	0 16 48	0 17 52	0 19 1	0 20 13
19	0 10 53	0 11 1	0 11 14	0 11 32	0 11 55	0 12 23	0 12 57	0 13 36	0 14 20	0 15 7	0 16 1	0 16 59	0 18 4	0 19 14	0 20 28
20	0 10 55	0 11 3	0 11 16	0 11 35	0 11 58	0 12 27	0 13 1	0 13 41	0 14 26	0 15 15	0 16 11	0 17 11	0 18 17	0 19 28	0 20 44
21	0 10 57	0 11 4	0 11 18	0 11 37	0 12 1	0 12 31	0 13 6	0 13 47	0 14 33	0 15 24	0 16 21	0 17 23	0 18 30	0 19 43	0 21 1
22	0 10 58	0 11 6	0 11 20	0 11 39	0 12 4	0 12 35	0 13 11	0 13 53	0 14 40	0 15 33	0 16 32	0 17 35	0 18 44	0 19 59	0 21 19
23	0 10 59	0 11 8	0 11 22	0 11 42	0 12 8	0 12 40	0 13 17	0 14 0	0 14 48	0 15 43	0 16 43	0 17 48	0 18 58	0 20 15	0 21 37

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 26	0 10 31	0 10 40	0 10 52	0 11 8	0 11 28	0 11 51	0 12 17	0 12 47	0 13 21	0 13 57	0 14 38	0 15 22	0 16 10	0 17 1
1	0 10 24	0 10 29	0 10 38	0 10 50	0 11 5	0 11 25	0 11 48	0 12 13	0 12 43	0 13 17	0 13 52	0 14 33	0 15 16	0 16 2	0 16 54
2	0 10 22	0 10 27	0 10 36	0 10 48	0 11 2	0 11 22	0 11 45	0 12 9	0 12 39	0 13 12	0 13 47	0 14 27	0 15 10	0 15 54	0 16 46
3	0 10 20	0 10 25	0 10 34	0 10 45	0 10 59	0 11 19	0 11 42	0 12 5	0 12 35	0 13 7	0 13 42	0 14 21	0 15 4	0 15 47	0 16 38
4	0 10 18	0 10 23	0 10 31	0 10 42	0 10 56	0 11 16	0 11 38	0 12 1	0 12 31	0 13 2	0 13 37	0 14 15	0 14 58	0 15 40	0 16 30
5	0 10 16	0 10 21	0 10 28	0 10 39	0 10 53	0 11 13	0 11 34	0 11 57	0 12 27	0 12 57	0 13 32	0 14 9	0 14 52	0 15 33	0 16 22
6	0 10 13	0 10 18	0 10 25	0 10 36	0 10 50	0 11 10	0 11 30	0 11 53	0 12 23	0 12 52	0 13 27	0 14 3	0 14 45	0 15 26	0 16 14
7	0 10 10	0 10 15	0 10 22	0 10 33	0 10 47	0 11 6	0 11 26	0 11 49	0 12 18	0 12 47	0 13 22	0 13 57	0 14 38	0 15 19	0 16 6
8	0 10 7	0 10 12	0 10 19	0 10 30	0 10 44	0 11 2	0 11 22	0 11 45	0 12 13	0 12 42	0 13 16	0 13 51	0 14 31	0 15 12	0 15 58
9	0 10 4	0 10 9	0 10 16	0 10 27	0 10 41	0 10 58	0 11 18	0 11 41	0 12 8	0 12 37	0 13 10	0 13 45	0 14 24	0 15 5	0 15 50
10	0 10 1	0 10 6	0 10 13	0 10 24	0 10 38	0 10 54	0 11 14	0 11 37	0 12 3	0 12 32	0 13 4	0 13 39	0 14 17	0 14 58	0 15 42
11	0 9 58	0 10 3	0 10 10	0 10 20	0 10 34	0 10 50	0 11 10	0 11 33	0 11 58	0 12 27	0 12 58	0 13 33	0 14 10	0 14 51	0 15 34
12	0 9 55	0 10 0	0 10 6	0 10 16	0 10 30	0 10 46	0 11 6	0 11 28	0 11 53	0 12 22	0 12 52	0 13 27	0 14 7	0 14 44	0 15 26
13	0 9 52	0 9 56	0 10 2	0 10 12	0 10 26	0 10 42	0 11 2	0 11 23	0 11 48	0 12 17	0 12 46	0 13 21	0 13 56	0 14 37	0 15 18
14	0 9 48	0 9 52	0 9 58	0 10 8	0 10 22	0 10 38	0 10 58	0 11 18	0 11 43	0 12 12	0 12 40	0 13 15	0 13 49	0 14 30	0 15 10
15	0 9 44	0 9 48	0 9 54	0 10 4	0 10 18	0 10 34	0 10 53	0 11 13	0 11 38	0 12 6	0 12 34	0 13 9	0 13 42	0 14 23	0 15 2
16	0 9 40	0 9 44	0 9 50	0 10 0	0 10 14	0 10 30	0 10 48	0 11 8	0 11 33	0 12 0	0 12 28	0 13 2	0 13 35	0 14 15	0 14 54
17	0 9 38	0 9 40	0 9 46	0 9 56	0 10 10	0 10 25	0 10 43	0 11 3	0 11 28	0 11 54	0 12 22	0 12 55	0 13 28	0 14 7	0 14 46
18	0 9 34	0 9 36	0 9 42	0 9 52	0 10 6	0 10 20	0 10 38	0 10 58	0 11 22	0 11 48	0 12 16	0 12 48	0 13 21	0 13 59	0 14 38
19	0 9 29	0 9 32	0 9 38	0 9 48	0 10 1	0 10 15	0 10 33	0 10 53	0 11 16	0 11 42	0 12 10	0 12 41	0 13 24	0 13 51	0 14 30
20	0 9 24	0 9 28	0 9 34	0 9 44	0 9 56	0 10 10	0 10 28	0 10 48	0 11 10	0 11 36	0 12 3	0 12 34	0 13 7	0 13 43	0 14 22
21	0 9 19	0 9 23	0 9 29	0 9 39	0 9 50	0 10 5	0 10 22	0 10 42	0 11 4	0 11 29	0 11 56	0 12 27	0 12 59	0 13 35	0 14 13
22	0 9 14	0 9 18	0 9 24	0 9 33	0 9 44	0 9 59	0 10 16	0 10 35	0 10 57	0 11 22	0 11 49	0 12 19	0 12 51	0 13 26	0 14 4
23	0 9 8	0 9 12	0 9 18	0 9 27	0 9 38	0 9 53	0 10 9	0 10 28	0 10 50	0 11 14	0 11 41	0 12 11	0 12 43	0 13 17	0 13 54

LATITUDE 48° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 17 55	0 18 54	0 19 55	0 21 1	0 22 10	0 23 22	0 24 37	0 25 56	0 27 19	0 28 45	0 30 14	0 31 47	0 33 24	0 35 4	0 36 47
1	0 18 5	0 19 5	0 20 7	0 21 14	0 22 24	0 23 37	0 24 53	0 26 13	0 27 37	0 29 4	0 30 34	0 32 8	0 33 46	0 35 27	0 37 11
2	0 18 15	0 19 16	0 20 19	0 21 27	0 22 38	0 23 52	0 25 9	0 26 30	0 27 55	0 29 23	0 30 55	0 32 30	0 34 9	0 35 51	0 37 37
3	0 18 25	0 19 27	0 20 31	0 21 41	0 22 52	0 24 7	0 25 25	0 26 48	0 28 14	0 29 43	0 31 17	0 32 53	0 34 34	0 36 17	0 38 5
4	0 18 35	0 19 38	0 20 43	0 21 55	0 23 7	0 24 23	0 25 42	0 27 6	0 28 33	0 30 4	0 31 40	0 33 18	0 35 1	0 36 45	0 38 35
5	0 18 45	0 19 49	0 20 56	0 22 9	0 23 22	0 24 39	0 25 59	0 27 24	0 28 53	0 30 26	0 32 4	0 33 44	0 35 29	0 37 15	0 39 7
6	0 18 55	0 20 0	0 21 9	0 22 23	0 23 37	0 24 56	0 26 17	0 27 43	0 29 14	0 30 49	0 32 29	0 34 11	0 35 58	0 37 46	0 39 40
7	0 19 5	0 20 11	0 21 22	0 22 37	0 23 52	0 25 13	0 26 36	0 28 3	0 29 36	0 31 13	0 32 54	0 34 38	0 36 27	0 38 18	0 40 14
8	0 19 16	0 20 23	0 21 35	0 22 51	0 24 8	0 25 31	0 26 56	0 28 24	0 29 59	0 31 38	0 33 20	0 35 6	0 36 57	0 38 50	0 40 48
9	0 19 27	0 20 35	0 21 48	0 23 5	0 24 24	0 25 49	0 27 16	0 28 46	0 30 23	0 32 3	0 33 47	0 35 35	0 37 28	0 39 23	0 41 23
10	0 19 38	0 20 47	0 22 1	0 23 19	0 24 40	0 26 7	0 27 36	0 29 9	0 30 47	0 32 29	0 34 15	0 36 5	0 38 0	0 39 57	0 41 59
11	0 19 50	0 21 0	0 22 14	0 23 34	0 24 57	0 26 26	0 27 57	0 29 32	0 31 12	0 32 56	0 34 44	0 36 36	0 38 33	0 40 32	0 42 36
12	0 20 3	0 21 14	0 22 28	0 23 50	0 25 15	0 26 46	0 28 19	0 29 56	0 31 38	0 33 24	0 35 14	0 37 8	0 39 7	0 41 9	0 43 15
13	0 20 16	0 21 29	0 22 43	0 24 6	0 25 34	0 27 7	0 28 42	0 30 21	0 32 5	0 33 53	0 35 45	0 37 41	0 39 43	0 41 42	0 43 57
14	0 20 30	0 21 44	0 22 59	0 24 23	0 25 54	0 27 29	0 29 6	0 30 47	0 32 33	0 34 23	0 36 17	0 38 16	0 40 20	0 42 29	0 44 41
15	0 20 44	0 22 0	0 23 16	0 24 41	0 26 15	0 27 52	0 29 31	0 31 14	0 33 3	0 34 55	0 36 51	0 38 53	0 41 0	0 43 12	0 45 27
16	0 20 59	0 22 16	0 23 35	0 25 1	0 26 37	0 28 16	0 29 57	0 31 43	0 33 34	0 35 29	0 37 27	0 39 32	0 41 42	0 43 57	0 46 15
17	0 21 14	0 22 33	0 23 55	0 25 23	0 27 1	0 28 41	0 30 25	0 32 13	0 34 7	0 36 5	0 38 6	0 40 14	0 42 26	0 44 44	0 47 5
18	0 21 30	0 22 51	0 24 16	0 25 46	0 27 26	0 29 8	0 30 54	0 32 45	0 34 42	0 36 43	0 38 47	0 40 58	0 43 12	0 45 33	0 47 57
19	0 21 47	0 23 10	0 24 38	0 26 11	0 27 52	0 29 36	0 31 25	0 33 19	0 35 19	0 37 23	0 39 30	0 41 44	0 44 1	0 46 25	0 48 52
20	0 22 5	0 23 30	0 25 1	0 26 37	0 28 19	0 30 6	0 31 58	0 33 55	0 35 58	0 38 5	0 40 15	0 42 33	0 44 53	0 47 19	0 49 51
21	0 22 24	0 23 51	0 25 25	0 27 4	0 28 48	0 30 38	0 32 33	0 34 33	0 36 39	0 38 49	0 41 3	0 43 23	0 45 48	0 48 18	0 50 54
22	0 22 44	0 24 14	0 25 50	0 27 32	0 29 19	0 31 12	0 33 10	0 35 14	0 37 23	0 39 36	0 41 54	0 44 17	0 46 47	0 49 21	0 52 1
23	0 23 4	0 24 38	0 26 17	0 28 2	0 29 52	0 31 49	0 33 51	0 35 58	0 38 10	0 40 27	0 42 49	0 45 16	0 47 50	0 50 29	0 53 14

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 17 55	0 18 55	0 19 55	0 21 1	0 22 10	0 23 22	0 24 37	0 25 56	0 27 19	0 28 45	0 30 14	0 31 47	0 33 24	0 35 4	0 36 47
1	0 17 46	0 18 45	0 19 44	0 20 49	0 21 57	0 23 8	0 24 23	0 25 40	0 27 2	0 28 27	0 29 55	0 31 27	0 33 2	0 34 40	0 36 21
2	0 17 37	0 18 35	0 19 33	0 20 37	0 21 45	0 22 55	0 24 9	0 25 25	0 26 45	0 28 9	0 29 36	0 31 7	0 32 40	0 34 16	0 35 55
3	0 17 28	0 18 25	0 19 23	0 20 26	0 21 33	0 22 42	0 23 55	0 25 10	0 26 29	0 27 51	0 29 17	0 30 47	0 32 18	0 33 52	0 35 30
4	0 17 19	0 18 15	0 19 13	0 20 15	0 21 21	0 22 29	0 23 41	0 24 55	0 26 13	0 27 33	0 28 58	0 30 27	0 31 56	0 33 29	0 35 6
5	0 17 10	0 18 5	0 19 3	0 20 4	0 21 9	0 22 16	0 23 27	0 24 40	0 25 56	0 27 16	0 28 39	0 30 7	0 31 35	0 33 7	0 34 42
6	0 17 2	0 17 56	0 18 53	0 19 53	0 20 57	0 22 3	0 23 13	0 24 25	0 25 40	0 26 59	0 28 21	0 29 47	0 31 14	0 32 45	0 34 18
7	0 16 54	0 17 47	0 18 43	0 19 42	0 20 45	0 21 50	0 22 59	0 24 10	0 25 24	0 26 42	0 28 3	0 29 27	0 30 53	0 32 23	0 33 55
8	0 16 46	0 17 38	0 18 33	0 19 31	0 20 33	0 21 37	0 22 46	0 23 55	0 25 8	0 26 25	0 27 45	0 29 7	0 30 33	0 32 2	0 33 33
9	0 16 38	0 17 29	0 18 23	0 19 20	0 20 21	0 21 24	0 22 33	0 23 40	0 24 52	0 26 8	0 27 27	0 28 48	0 30 13	0 31 41	0 33 11
10	0 16 30	0 17 20	0 18 13	0 19 9	0 20 9	0 21 11	0 22 17	0 23 25	0 24 37	0 25 51	0 27 9	0 28 29	0 29 53	0 31 20	0 32 49
11	0 16 22	0 17 11	0 18 3	0 18 59	0 19 58	0 20 58	0 22 3	0 23 11	0 24 22	0 25 35	0 26 52	0 28 11	0 29 34	0 31 0	0 32 27
12	0 16 14	0 17 2	0 17 53	0 18 49	0 19 47	0 20 45	0 21 50	0 22 57	0 24 7	0 25 19	0 26 35	0 27 53	0 29 15	0 30 40	0 32 6
13	0 16 6	0 16 53	0 17 43	0 18 39	0 19 36	0 20 33	0 21 37	0 22 43	0 23 52	0 25 4	0 26 18	0 27 35	0 28 56	0 30 20	0 31 45
14	0 15 57	0 16 44	0 17 33	0 18 29	0 19 25	0 20 21	0 21 24	0 22 29	0 23 37	0 24 48	0 26 1	0 27 17	0 28 37	0 30 0	0 31 24
15	0 15 48	0 16 35	0 17 23	0 18 18	0 19 14	0 20 9	0 21 11	0 22 15	0 23 22	0 24 32	0 25 44	0 26 59	0 28 18	0 29 40	0 31 3
16	0 15 39	0 16 26	0 17 13	0 18 7	0 19 2	0 19 57	0 20 58	0 22 1	0 23 7	0 24 16	0 25 27	0 26 41	0 27 59	0 29 20	0 30 42
17	0 15 30	0 16 17	0 17 3	0 17 56	0 18 50	0 19 45	0 20 45	0 21 47	0 22 52	0 24 0	0 25 10	0 26 23	0 27 40	0 29 0	0 30 21
18	0 15 21	0 16 7	0 16 53	0 17 45	0 18 38	0 19 33	0 20 32	0 21 33	0 22 37	0 23 44	0 24 53	0 26 5	0 27 21	0 28 40	0 30 0
19	0 15 12	0 15 57	0 16 43	0 17 34	0 18 26	0 19 21	0 20 19	0 21 19	0 22 22	0 23 28	0 24 37	0 25 48	0 27 2	0 28 20	0 29 39
20	0 15 3	0 15 47	0 16 33	0 17 23	0 18 14	0 19 9	0 20 6	0 21 6	0 22 13	0 23 13	0 24 21	0 25 31	0 26 44	0 28 0	0 29 18
21	0 14 54	0 15 37	0 16 23	0 17 12	0 18 2	0 18 56	0 19 53	0 20 52	0 22 8	0 22 57	0 24 4	0 25 13	0 26 25	0 27 40	0 28 57
22	0 14 44	0 15 27	0 16 12	0 17 0	0 17 50	0 18 43	0 19 39	0 20 38	0 21 58	0 22 41	0 23 47	0 24 55	0 26 6	0 27 20	0 28 36
23	0 14 34	0 15 16	0 16 1	0 16 48	0 17 38	0 18 30	0 19 25	0 20 23	0 21 23	0 22 25	0 23 30	0 24 38	0 25 48	0 27 1	0 28 16

LATITUDE 48° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 38 34	0 40 24	0 42 18	0 44 15	0 46 15	0 48 19	0 50 26	0 52 37	0 54 51	0 57 8	0 59 29	1 1 53	1 4 20	1 6 51	1 9 25
1	0 39 0	0 40 53	0 42 49	0 44 48	0 46 50	0 48 56	0 51 7	0 53 21	0 55 37	0 57 56	1 0 19	1 2 40	1 5 10	1 7 43	1 10 18
2	0 39 28	0 41 23	0 43 21	0 45 22	0 47 26	0 49 34	0 51 50	0 54 6	0 56 24	0 58 45	1 1 10	1 3 29	1 6 1	1 8 37	1 11 14
3	0 39 57	0 41 54	0 43 54	0 45 57	0 48 4	0 50 14	0 52 34	0 54 52	0 57 12	0 59 35	1 2 2	1 4 20	1 6 54	1 9 33	1 12 13
4	0 40 28	0 42 27	0 44 29	0 46 34	0 48 43	0 50 55	0 53 19	0 55 39	0 58 1	1 0 26	1 2 55	1 5 14	1 7 50	1 10 32	1 13 15
5	0 41 1	0 43 2	0 45 6	0 47 13	0 49 24	0 51 38	0 54 4	0 56 26	0 58 51	1 1 18	1 3 50	1 6 11	1 8 49	1 11 34	1 14 20
6	0 41 36	0 43 38	0 45 44	0 47 53	0 50 6	0 52 22	0 54 50	0 57 14	0 59 42	1 2 11	1 4 46	1 7 10	1 9 55	1 12 39	1 15 28
7	0 42 12	0 44 15	0 46 23	0 48 34	0 50 49	0 53 8	0 55 37	0 58 3	1 0 34	1 3 6	1 5 44	1 8 12	1 10 56	1 13 47	1 16 39
8	0 42 48	0 44 53	0 47 3	0 49 16	0 51 34	0 53 56	0 56 25	0 58 53	1 1 27	1 4 2	1 6 43	1 9 17	1 12 4	1 14 58	1 17 53
9	0 43 25	0 45 33	0 47 45	0 50 1	0 52 21	0 54 46	0 57 15	0 59 45	1 2 22	1 5 1	1 7 45	1 10 25	1 13 15	1 16 12	1 19 10
10	0 44 4	0 46 15	0 48 29	0 50 48	0 53 11	0 55 37	0 58 7	1 0 39	1 3 20	1 6 3	1 8 48	1 11 35	1 14 29	1 17 29	1 20 30
11	0 44 45	0 46 59	0 49 16	0 51 38	0 54 4	0 56 33	0 59 0	1 1 36	1 4 20	1 7 6	1 9 54	1 12 48	1 15 46	1 18 49	1 21 54
12	0 45 28	0 47 45	0 50 5	0 52 30	0 54 59	0 57 31	0 59 57	1 2 36	1 5 23	1 8 12	1 11 4	1 14 4	1 17 5	1 20 12	1 23 21
13	0 46 13	0 48 33	0 50 56	0 53 24	0 55 56	0 58 31	1 0 57	1 3 40	1 6 30	1 9 22	1 12 18	1 15 24	1 18 28	1 21 39	1 24 52
14	0 47 0	0 49 23	0 51 49	0 54 20	0 56 55	0 59 33	1 2 1	1 4 48	1 7 41	1 10 37	1 13 37	1 16 47	1 19 55	1 23 9	1 26 26
15	0 47 49	0 50 15	0 52 44	0 55 18	0 57 56	1 0 38	1 3 9	1 6 0	1 8 55	1 11 56	1 15 0	1 18 13	1 21 25	1 24 43	1 28 4
16	0 48 40	0 51 9	0 53 41	0 56 18	0 58 59	1 1 45	1 4 21	1 7 16	1 10 14	1 13 19	1 16 27	1 19 42	1 22 58	1 26 20	1 29 45
17	0 49 33	0 52 5	0 54 40	0 57 20	1 0 4	1 2 56	1 5 37	1 8 36	1 11 37	1 14 46	1 17 58	1 21 15	1 24 34	1 28 0	1 31 30
18	0 50 28	0 53 3	0 55 42	0 58 25	1 1 12	1 4 8	1 6 57	1 10 0	1 13 5	1 16 18	1 19 33	1 22 52	1 26 15	1 29 45	1 33 18
19	0 51 26	0 54 5	0 56 48	0 59 34	1 2 25	1 5 25	1 8 21	1 11 28	1 14 37	1 17 54	1 21 13	1 24 35	1 28 2	1 31 36	1 35 13
20	0 52 28	0 55 11	0 57 58	1 0 48	1 3 43	1 6 45	1 9 51	1 13 1	1 16 15	1 19 35	1 22 58	1 26 24	1 29 56	1 33 34	1 37 16
21	0 53 35	0 56 23	0 59 14	1 2 9	1 5 9	1 8 15	1 11 25	1 14 40	1 17 59	1 21 24	1 24 53	1 28 21	1 31 58	1 35 41	1 39 29
22	0 54 47	0 57 40	1 0 35	1 3 35	1 6 40	1 9 50	1 13 4	1 16 24	1 19 49	1 23 20	1 26 54	1 30 27	1 34 10	1 37 58	1 41 52
23	0 56 5	0 59 2	1 2 3	1 5 8	1 8 17	1 11 31	1 14 50	1 18 15	1 21 46	1 25 23	1 29 3	1 32 47	1 36 36	1 40 30	1 44 30

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 38 34	0 40 24	0 42 18	0 44 15	0 46 15	0 48 19	0 50 26	0 52 37	0 54 51	0 57 8	0 59 29	1 1 53	1 4 20	1 6 51	1 9 25
1	0 38 6	0 39 54	0 41 47	0 43 43	0 45 42	0 47 44	0 49 49	0 51 58	0 54 9	0 56 24	0 58 43	1 1 5	1 3 29	1 5 59	1 8 30
2	0 37 38	0 39 25	0 41 16	0 43 11	0 45 9	0 47 9	0 49 12	0 51 20	0 53 28	0 55 41	0 57 58	1 0 18	1 2 39	1 5 7	1 7 36
3	0 37 11	0 38 56	0 40 46	0 42 40	0 44 37	0 46 34	0 48 36	0 50 42	0 52 48	0 54 59	0 57 14	0 59 32	1 1 50	1 4 16	1 6 43
4	0 36 45	0 38 28	0 40 16	0 42 9	0 44 5	0 46 0	0 48 0	0 50 4	0 52 8	0 54 17	0 56 30	0 58 46	1 1 2	1 3 26	1 5 51
5	0 36 20	0 38 1	0 39 47	0 41 38	0 43 33	0 45 26	0 47 25	0 49 27	0 51 29	0 53 36	0 55 47	0 58 1	1 0 14	1 2 36	1 4 59
6	0 35 55	0 37 35	0 39 19	0 41 8	0 43 1	0 44 53	0 46 50	0 48 51	0 50 51	0 52 56	0 55 5	0 57 17	0 59 28	1 1 48	1 4 9
7	0 35 31	0 37 10	0 38 52	0 40 39	0 42 30	0 44 21	0 46 16	0 48 15	0 50 14	0 52 17	0 54 24	0 56 34	0 58 44	1 1 2	1 3 21
8	0 35 8	0 36 46	0 38 26	0 40 11	0 42 0	0 43 50	0 45 43	0 47 39	0 49 38	0 51 39	0 53 44	0 55 52	0 58 2	1 0 18	1 2 35
9	0 34 45	0 36 22	0 38 1	0 39 44	0 41 31	0 43 20	0 45 11	0 47 4	0 49 3	0 51 3	0 53 6	0 55 12	0 57 21	0 59 35	1 1 50
10	0 34 22	0 35 58	0 37 36	0 39 18	0 41 3	0 42 51	0 44 40	0 46 33	0 48 29	0 50 28	0 52 29	0 54 33	0 56 41	0 58 53	1 1 6
11	0 33 59	0 35 34	0 37 11	0 38 52	0 40 35	0 42 22	0 44 10	0 46 1	0 47 56	0 49 53	0 51 53	0 53 55	0 56 2	0 58 12	1 0 23
12	0 33 36	0 35 10	0 36 46	0 38 26	0 40 7	0 41 53	0 43 40	0 45 29	0 47 23	0 49 18	0 51 17	0 53 18	0 55 23	0 57 31	0 59 40
13	0 33 13	0 34 46	0 36 21	0 38 0	0 39 39	0 41 24	0 43 10	0 44 57	0 46 50	0 48 44	0 50 41	0 52 41	0 54 44	0 56 50	0 58 58
14	0 32 51	0 34 22	0 35 56	0 37 34	0 39 11	0 40 55	0 42 40	0 44 25	0 46 17	0 48 10	0 50 5	0 52 4	0 54 5	0 56 9	0 58 16
15	0 32 29	0 33 58	0 35 31	0 37 8	0 38 44	0 40 26	0 42 10	0 43 54	0 45 44	0 47 36	0 49 29	0 51 27	0 53 26	0 55 28	0 57 34
16	0 32 7	0 33 35	0 35 6	0 36 42	0 38 17	0 39 57	0 41 40	0 43 23	0 45 11	0 47 2	0 48 53	0 50 55	0 52 47	0 54 47	0 56 52
17	0 31 45	0 33 12	0 34 41	0 36 16	0 37 50	0 39 28	0 41 10	0 42 52	0 44 38	0 46 28	0 48 18	0 50 13	0 52 8	0 54 7	0 56 10
18	0 31 23	0 32 49	0 34 15	0 35 50	0 37 23	0 38 59	0 40 40	0 42 21	0 44 5	0 45 54	0 47 43	0 49 36	0 51 29	0 53 27	0 55 28
19	0 31 1	0 32 26	0 33 53	0 35 24	0 36 56	0 38 31	0 41 10	0 41 50	0 43 33	0 45 20	0 47 8	0 48 59	0 50 51	0 52 47	0 54 46
20	0 30 39	0 32 3	0 33 29	0 34 58	0 36 29	0 38 3	0 39 40	0 41 19	0 43 1	0 44 46	0 46 33	0 48 22	0 50 13	0 52 7	0 54 4
21	0 30 17	0 31 40	0 33 5	0 34 33	0 36 3	0 37 35	0 39 11	0 40 49	0 42 30	0 44 13	0 45 58	0 47 46	0 49 36	0 51 28	0 53 23
22	0 29 55	0 31 17	0 32 41	0 34 8	0 35 37	0 37 8	0 38 42	0 40 19	0 41 59	0 43 40	0 45 24	0 47 10	0 48 59	0 50 50	0 52 43
23	0 29 34	0 30 54	0 32 17	0 33 43	0 35 11	0 36 41	0 38 14	0 39 50	0 41 28	0 43 8	0 44 50	0 46 35	0 48 22	0 50 12	0 52 4

LATITUDE 48° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 12 2	1 14 43	1 17 27	1 20 14	1 23 5	1 25 59	1 28 56	1 31 56	1 34 59	1 38 6	1 41 16	1 44 29	1 47 45	1 51 5	1 54 28
1	1 12 57	1 15 41	1 18 28	1 21 17	1 24 9	1 27 6	1 30 6	1 33 9	1 36 15	1 39 25	1 42 38	1 45 54	1 49 13	1 52 37	1 56 4
2	1 13 55	1 16 42	1 19 31	1 22 23	1 25 17	1 28 16	1 31 19	1 34 25	1 37 34	1 40 47	1 44 3	1 47 22	1 50 44	1 54 12	1 57 43
3	1 14 56	1 17 46	1 20 38	1 23 33	1 26 29	1 29 21	1 32 37	1 35 45	1 38 57	1 42 13	1 45 32	1 48 54	1 52 19	1 55 51	1 59 26
4	1 16 1	1 18 53	1 21 48	1 24 46	1 27 45	1 30 50	1 33 59	1 37 9	1 40 24	1 43 43	1 47 5	2 50 30	1 53 58	1 57 34	2 1 13
5	1 17 9	1 20 3	1 23 1	1 26 2	1 29 4	1 32 12	1 35 24	1 38 37	1 41 55	1 45 17	1 48 42	1 52 10	1 55 41	1 59 21	2 3 4
6	1 18 20	1 21 17	1 24 18	1 27 22	1 30 27	1 33 38	1 36 53	1 40 9	1 43 30	1 46 55	1 50 23	1 53 54	1 57 28	2 1 11	2 4 58
7	1 19 34	1 22 34	1 25 38	1 28 45	1 31 53	1 35 7	1 38 25	1 41 45	1 45 10	1 48 38	1 32 9	1 55 42	1 59 19	2 3 6	2 6 57
8	1 20 51	1 23 54	1 27 1	1 30 11	1 33 23	1 36 40	1 40 1	1 43 25	1 46 54	1 50 25	1 53 59	1 57 35	2 1 16	2 5 7	2 9 2
9	1 22 11	1 25 17	1 28 27	1 31 40	1 34 56	1 38 16	1 41 40	1 45 8	1 48 41	1 52 16	1 55 54	1 59 34	2 3 19	2 7 13	2 11 12
10	1 23 34	1 26 43	1 29 56	1 33 13	1 36 33	1 39 56	1 43 23	1 46 55	1 50 32	1 54 11	1 57 53	2 1 39	2 5 29	2 9 25	2 13 28
11	1 25 2	1 28 13	1 31 30	1 34 51	1 38 14	1 41 41	1 45 10	1 48 46	1 52 27	1 56 10	1 59 57	2 3 48	2 7 43	2 11 43	2 15 50
12	1 26 33	1 29 47	1 33 7	1 36 32	1 39 58	1 43 29	1 47 1	1 50 41	1 54 26	1 58 14	2 2 6	2 6 2	2 10 1	2 14 5	2 18 16
13	1 28 8	1 31 25	1 34 48	1 38 17	1 41 47	1 45 22	1 48 57	1 52 41	1 56 30	2 0 23	2 4 19	2 8 20	2 12 24	2 16 32	2 20 47
14	1 29 46	1 33 7	1 36 33	1 40 6	1 43 40	1 47 19	1 50 58	1 54 46	1 58 39	2 2 37	2 6 37	2 10 43	2 14 52	2 19 5	2 23 24
15	1 31 28	1 34 52	1 38 22	1 41 59	1 45 37	1 49 20	1 53 4	1 56 56	2 0 53	2 4 56	2 9 2	2 13 13	2 17 27	2 21 44	2 26 7
16	1 33 13	1 36 42	1 40 16	1 43 57	1 47 39	1 51 26	1 55 16	1 59 12	2 3 14	2 7 22	2 11 33	2 15 49	2 20 8	2 24 30	2 28 57
17	1 35 2	1 38 37	1 42 16	1 46 1	1 49 48	1 53 40	1 57 35	2 1 35	2 5 42	2 9 55	2 14 11	2 18 32	2 22 56	2 27 23	2 31 54
18	1 36 56	1 40 37	1 44 22	1 48 11	1 52 3	1 55 0	2 0 1	2 4 6	2 8 18	2 12 36	2 16 57	2 21 23	2 25 52	2 30 24	2 35 0
19	1 38 57	1 42 43	1 46 34	1 50 28	1 54 26	1 58 27	2 2 34	2 6 45	2 11 2	2 15 25	2 19 52	2 24 23	2 28 57	2 33 34	2 38 15
20	1 41 5	1 44 57	1 48 54	1 52 54	1 56 58	2 1 5	2 5 17	2 9 34	2 13 56	2 18 24	2 22 57	2 27 33	2 32 12	2 36 54	2 41 40
21	1 43 24	1 47 21	1 51 22	1 55 29	1 59 40	2 3 53	2 8 11	2 12 34	2 17 2	2 21 36	2 26 15	2 30 57	2 35 43	2 40 32	2 45 25
22	1 45 53	1 49 56	1 54 1	1 58 14	2 2 32	2 6 51	2 11 16	2 15 45	2 20 19	2 24 59	2 29 44	2 34 33	2 39 26	2 44 21	2 49 21
23	1 48 36	1 52 45	1 56 55	2 1 14	2 5 39	2 10 4	2 14 36	2 19 12	2 23 52	2 28 37	2 33 28	2 38 23	2 43 22	2 48 24	2 53 30

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 12 2	1 14 43	1 17 27	1 20 14	1 23 5	1 25 59	1 28 56	1 31 56	1 34 59	1 38 6	1 41 16	1 44 29	1 47 45	1 51 5	1 54 28
1	1 11 5	1 13 39	1 16 20	1 19 5	1 21 54	1 24 46	1 27 43	1 30 40	1 33 40	1 36 44	1 39 53	1 43 3	1 46 16	1 49 33	1 52 53
2	1 10 9	1 12 37	1 15 16	1 17 59	1 20 46	1 23 34	1 26 32	1 29 26	1 32 23	1 35 24	1 38 33	1 41 40	1 44 50	1 48 4	1 51 21
3	1 9 14	1 11 38	1 14 15	1 16 56	1 19 40	1 22 25	1 25 23	1 28 14	1 31 8	1 34 7	1 37 15	1 40 19	1 43 26	1 46 37	1 49 52
4	1 8 19	1 10 42	1 13 17	1 15 55	1 18 37	1 21 19	1 24 15	1 27 4	1 29 55	1 32 52	1 35 59	1 39 0	1 42 4	1 45 12	1 48 25
5	1 7 25	1 9 48	1 12 21	1 14 57	1 17 36	1 20 16	1 23 9	1 25 56	1 28 44	1 31 39	1 34 44	1 37 43	1 40 44	1 43 50	1 47 1
6	1 6 33	1 8 56	1 11 27	1 14 1	1 16 38	1 19 15	1 22 5	1 24 50	1 27 35	1 30 28	1 33 30	1 36 27	1 39 26	1 42 30	1 45 39
7	1 5 43	1 8 6	1 10 35	1 13 7	1 15 42	1 18 16	1 21 2	1 23 45	1 26 28	1 29 19	1 32 17	1 35 12	1 38 9	1 41 11	1 44 18
8	1 4 55	1 7 17	1 9 44	1 12 14	1 14 47	1 17 19	1 20 1	1 22 42	1 25 23	1 28 12	1 31 6	1 33 59	1 36 54	1 39 54	1 42 59
9	1 4 8	1 6 29	1 8 54	1 11 22	1 13 53	1 16 24	1 19 2	1 21 41	1 24 20	1 27 7	1 29 57	1 32 48	1 35 41	1 38 39	1 41 42
10	1 3 22	1 5 42	1 8 5	1 10 31	1 12 59	1 15 30	1 18 4	1 20 41	1 23 20	1 26 3	1 28 49	1 31 38	1 34 29	1 37 25	1 40 26
11	1 2 38	1 4 56	1 7 17	1 9 41	1 12 7	1 14 37	1 17 7	1 19 42	1 22 19	1 25 0	1 27 43	1 30 29	1 33 18	1 36 12	1 39 10
12	1 1 54	1 4 10	1 6 29	1 8 51	1 11 15	1 13 44	1 16 10	1 18 43	1 21 19	1 23 58	1 26 38	1 29 21	1 32 8	1 35 0	1 37 55
13	1 1 10	1 3 24	1 5 41	1 8 1	1 10 23	1 12 51	1 15 14	1 17 45	1 20 19	1 22 56	1 25 34	1 28 14	1 30 59	1 33 48	1 36 40
14	1 0 26	1 2 38	1 4 53	1 7 11	1 9 32	1 11 58	1 14 18	1 16 47	1 19 20	1 21 55	1 24 30	1 27 8	1 29 51	1 32 37	1 35 27
15	0 59 42	1 1 52	1 4 6	1 6 22	1 8 41	1 11 5	1 13 23	1 15 50	1 18 21	1 20 54	1 23 27	1 26 3	1 28 44	1 31 27	1 34 15
16	0 58 58	1 1 6	1 3 19	1 5 33	1 7 50	1 10 12	1 12 28	1 14 43	1 17 22	1 19 53	1 22 24	1 24 59	1 27 37	1 30 18	1 33 4
17	0 58 14	1 0 21	1 2 32	1 4 44	1 6 59	1 9 19	1 11 34	1 13 57	1 16 24	1 18 53	1 21 22	1 23 55	1 26 31	1 29 10	1 31 54
18	0 57 30	0 59 36	1 1 45	1 3 55	1 6 9	1 8 26	1 10 40	1 13 1	1 15 26	1 17 53	1 20 23	1 22 52	1 25 26	1 28 3	1 30 45
19	0 56 46	0 58 51	1 0 58	1 3 7	1 5 19	1 7 33	1 9 47	1 12 6	1 14 29	1 16 54	1 19 21	1 21 50	1 24 22	1 26 57	1 29 37
20	0 56 3	0 58 6	1 0 11	1 2 19	1 4 29	1 6 41	1 8 55	1 11 12	1 13 33	1 15 56	1 18 22	1 20 49	1 23 19	1 25 52	1 28 29
21	0 55 21	0 57 22	0 59 26	1 1 32	1 3 40	1 5 50	1 8 3	1 10 19	1 12 38	1 14 59	1 17 23	1 19 49	1 22 17	1 24 48	1 27 22
22	0 54 40	0 56 39	0 58 41	1 0 45	1 2 52	1 5 0	1 7 12	1 9 26	1 11 43	1 14 2	1 16 25	1 18 49	1 21 15	1 23 44	1 26 15
23	0 53 59	0 55 56	0 57 56	0 59 59	1 2 4	1 4 11	1 6 21	1 8 33	1 10 48	1 13 6	1 15 27	1 17 50	1 20 14	1 22 40	1 25 8

LATITUDE 49° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 27	0 10 32	0 10 40	0 10 52	0 11 7	0 11 27	0 11 49	0 12 14	0 12 43	0 13 15	0 13 51	0 14 31	0 15 13	0 15 59	0 16 48
1	0 10 27	0 10 32	0 10 40	0 10 52	0 11 8	0 11 28	0 11 50	0 12 16	0 12 45	0 13 18	0 13 55	0 14 35	0 15 18	0 16 5	0 16 55
2	0 10 27	0 10 33	0 10 40	0 10 53	0 11 9	0 11 29	0 11 51	0 12 18	0 12 48	0 13 21	0 13 59	0 14 39	0 15 23	0 16 11	0 17 2
3	0 10 28	0 10 33	0 10 40	0 10 54	0 11 10	0 11 30	0 11 53	0 12 20	0 12 51	0 13 24	0 14 3	0 14 43	0 15 28	0 16 17	0 17 9
4	0 10 28	0 10 34	0 10 41	0 10 55	0 11 11	0 11 31	0 11 55	0 12 22	0 12 54	0 13 27	0 14 7	0 14 48	0 15 33	0 16 23	0 17 16
5	0 10 28	0 10 34	0 10 42	0 10 56	0 11 12	0 11 32	0 11 57	0 12 24	0 12 57	0 13 30	0 14 11	0 14 53	0 15 39	0 16 29	0 17 23
6	0 10 29	0 10 35	0 10 43	0 10 57	0 11 13	0 11 33	0 11 59	0 12 26	0 13 0	0 13 34	0 14 15	0 14 58	0 15 45	0 16 35	0 17 30
7	0 10 29	0 10 35	0 10 44	0 10 58	0 11 14	0 11 35	0 12 1	0 12 28	0 13 3	0 13 38	0 14 19	0 15 3	0 15 51	0 16 42	0 17 37
8	0 10 30	0 10 36	0 10 45	0 10 59	0 11 15	0 11 37	0 12 3	0 12 31	0 13 6	0 13 42	0 14 23	0 15 8	0 15 57	0 16 49	0 17 45
9	0 10 30	0 10 36	0 10 46	0 11 0	0 11 17	0 11 39	0 12 5	0 12 34	0 13 9	0 13 46	0 14 27	0 15 13	0 16 3	0 16 56	0 17 53
10	0 10 31	0 10 37	0 10 47	0 11 1	0 11 19	0 11 41	0 12 7	0 12 37	0 13 12	0 13 50	0 14 32	0 15 18	0 16 9	0 17 3	0 18 1
11	0 10 32	0 10 38	0 10 48	0 11 3	0 11 21	0 11 44	0 12 10	0 12 41	0 13 16	0 13 54	0 14 37	0 15 24	0 16 16	0 17 11	0 18 10
12	0 10 33	0 10 39	0 10 50	0 11 5	0 11 23	0 11 47	0 12 14	0 12 45	0 13 20	0 13 59	0 14 43	0 15 30	0 16 23	0 17 19	0 18 20
13	0 10 34	0 10 40	0 10 52	0 11 7	0 11 25	0 11 50	0 12 18	0 12 49	0 13 25	0 14 5	0 14 49	0 15 37	0 16 31	0 17 28	0 18 31
14	0 10 35	0 10 41	0 10 54	0 11 9	0 11 28	0 11 53	0 12 22	0 12 53	0 13 30	0 14 11	0 14 56	0 15 45	0 16 40	0 17 38	0 18 42
15	0 10 36	0 10 43	0 10 56	0 11 11	0 11 31	0 11 56	0 12 26	0 12 58	0 13 35	0 14 17	0 15 3	0 15 53	0 16 49	0 17 49	0 18 54
16	0 10 38	0 10 45	0 10 58	0 11 13	0 11 34	0 11 59	0 12 30	0 13 3	0 13 40	0 14 23	0 15 11	0 16 2	0 16 59	0 18 1	0 19 7
17	0 10 40	0 10 47	0 11 0	0 11 15	0 11 37	0 12 2	0 12 34	0 13 8	0 13 46	0 14 30	0 15 19	0 16 11	0 17 10	0 18 13	0 19 21
18	0 10 42	0 10 49	0 11 2	0 11 17	0 11 40	0 12 5	0 12 38	0 13 13	0 13 52	0 14 37	0 15 27	0 16 21	0 17 21	0 18 26	0 19 35
19	0 10 44	0 10 51	0 11 4	0 11 20	0 11 43	0 12 9	0 12 42	0 13 18	0 13 59	0 14 45	0 15 36	0 16 32	0 17 33	0 18 39	0 19 50
20	0 10 46	0 10 53	0 11 6	0 11 23	0 11 46	0 12 13	0 12 46	0 13 23	0 14 6	0 14 53	0 15 45	0 16 43	0 17 45	0 18 52	0 20 5
21	0 10 48	0 10 55	0 11 8	0 11 26	0 11 49	0 12 17	0 12 51	0 13 29	0 14 13	0 15 1	0 15 54	0 16 54	0 17 57	0 19 5	0 20 20
22	0 10 50	0 10 57	0 11 10	0 11 29	0 11 52	0 12 21	0 12 56	0 13 35	0 14 20	0 15 10	0 16 4	0 17 5	0 18 9	0 19 19	0 20 36
23	0 10 51	0 10 59	0 11 13	0 11 32	0 11 56	0 12 26	0 13 1	0 13 42	0 14 27	0 15 19	0 16 15	0 17 16	0 18 22	0 19 34	0 20 52

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 27	0 10 32	0 10 40	0 10 52	0 11 7	0 11 27	0 11 49	0 12 14	0 12 43	0 13 15	0 13 51	0 14 31	0 15 13	0 15 59	0 16 48
1	0 10 23	0 10 28	0 10 36	0 10 46	0 11 2	0 11 22	0 11 43	0 12 7	0 12 36	0 13 6	0 13 41	0 14 20	0 15 1	0 15 47	0 16 35
2	0 10 19	0 10 23	0 10 31	0 10 41	0 10 57	0 11 17	0 11 37	0 12 0	0 12 29	0 12 58	0 13 32	0 14 10	0 14 50	0 15 35	0 16 23
3	0 10 14	0 10 18	0 10 26	0 10 36	0 10 52	0 11 12	0 11 31	0 11 53	0 12 22	0 12 50	0 13 23	0 14 0	0 14 39	0 15 24	0 16 11
4	0 10 9	0 10 13	0 10 21	0 10 31	0 10 47	0 11 6	0 11 25	0 11 47	0 12 15	0 12 43	0 13 15	0 13 51	0 14 29	0 15 13	0 16 0
5	0 10 4	0 10 8	0 10 16	0 10 26	0 10 42	0 11 0	0 11 19	0 11 41	0 12 8	0 12 36	0 13 7	0 13 42	0 14 20	0 15 3	0 15 49
6	0 9 59	0 10 3	0 10 11	0 10 21	0 10 37	0 10 54	0 11 13	0 11 35	0 12 1	0 12 29	0 13 0	0 13 34	0 14 11	0 14 54	0 15 39
7	0 9 54	0 9 58	0 10 6	0 10 16	0 10 32	0 10 48	0 11 7	0 11 29	0 11 54	0 12 22	0 12 53	0 13 27	0 14 3	0 14 45	0 15 30
8	0 9 49	0 9 53	0 10 1	0 10 11	0 10 26	0 10 42	0 11 1	0 11 23	0 11 48	0 12 15	0 12 46	0 13 20	0 13 56	0 14 37	0 15 21
9	0 9 44	0 9 48	0 9 56	0 10 6	0 10 20	0 10 36	0 10 55	0 11 17	0 11 42	0 12 9	0 12 40	0 13 14	0 13 50	0 14 30	0 15 13
10	0 9 39	0 9 43	0 9 51	0 10 1	0 10 14	0 10 30	0 10 49	0 11 11	0 11 36	0 12 3	0 12 34	0 13 8	0 13 44	0 14 23	0 15 5
11	0 9 34	0 9 38	0 9 46	0 9 56	0 10 8	0 10 24	0 10 43	0 11 5	0 11 30	0 11 57	0 12 28	0 13 2	0 13 38	0 14 16	0 14 57
12	0 9 29	0 9 33	0 9 41	0 9 50	0 10 2	0 10 18	0 10 37	0 10 59	0 11 24	0 11 51	0 12 22	0 12 56	0 13 32	0 14 9	0 14 49
13	0 9 24	0 9 28	0 9 35	0 9 44	0 9 56	0 10 12	0 10 31	0 10 53	0 11 18	0 11 44	0 12 15	0 12 49	0 13 25	0 14 2	0 14 41
14	0 9 19	0 9 23	0 9 29	0 9 38	0 9 50	0 10 6	0 10 25	0 10 47	0 11 12	0 11 37	0 12 8	0 12 42	0 13 18	0 13 55	0 14 33
15	0 9 13	0 9 17	0 9 23	0 9 32	0 9 44	0 10 0	0 10 19	0 10 41	0 11 5	0 11 30	0 12 1	0 12 34	0 13 10	0 13 47	0 14 25
16	0 9 7	0 9 11	0 9 17	0 9 26	0 9 38	0 9 54	0 10 13	0 10 35	0 10 58	0 11 23	0 11 54	0 12 26	0 13 1	0 13 38	0 14 16
17	0 9 1	0 9 5	0 9 11	0 9 20	0 9 32	0 9 48	0 10 6	0 10 28	0 10 51	0 11 16	0 11 46	0 12 17	0 12 52	0 13 29	0 14 6
18	0 8 55	0 8 59	0 9 5	0 9 14	0 9 26	0 9 42	0 9 59	0 10 21	0 10 44	0 11 8	0 11 37	0 12 8	0 12 42	0 13 19	0 13 56
19	0 8 49	0 8 53	0 8 59	0 9 8	0 9 20	0 9 35	0 9 52	0 10 13	0 10 36	0 11 0	0 11 28	0 11 58	0 12 32	0 13 8	0 13 45
20	0 8 43	0 8 47	0 8 53	0 9 2	0 9 14	0 9 28	0 9 45	0 10 5	0 10 27	0 10 51	0 11 18	0 11 48	0 12 21	0 12 56	0 13 33
21	0 8 36	0 8 39	0 8 46	0 8 54	0 9 6	0 9 20	0 9 37	0 9 56	0 10 18	0 10 41	0 11 7	0 11 37	0 12 9	0 12 44	0 13 21
22	0 8 27	0 8 30	0 8 37	0 8 45	0 8 57	0 9 10	0 9 27	0 9 45	0 10 7	0 10 30	0 10 56	0 11 25	0 11 57	0 12 31	0 13 8
23	0 8 15	0 8 18	0 8 25	0 8 33	0 8 45	0 8 58	0 9 15	0 9 33	0 9 55	0 10 18	0 10 44	0 11 13	0 11 44	0 12 18	0 12 54

LATITUDE 49° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec	HOUR ANGLE OR TIME FROM NOON.														
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 17 41	0 18 38	0 19 37	0 20 40	0 21 46	0 22 56	0 24 9	0 25 26	0 26 45	0 28 8	0 29 35	0 31 5	0 32 38	0 34 14	0 35 54
1	0 17 49	0 18 47	0 19 47	0 20 51	0 21 56	0 23 7	0 24 21	0 25 39	0 26 59	0 28 23	0 29 51	0 31 22	0 32 59	0 34 37	0 36 18
2	0 17 57	0 18 56	0 19 57	0 21 2	0 22 7	0 23 19	0 24 34	0 25 53	0 27 14	0 28 39	0 30 8	0 31 40	0 33 21	0 35 1	0 36 43
3	0 18 5	0 19 5	0 20 7	0 21 13	0 22 18	0 23 31	0 24 48	0 26 8	0 27 30	0 28 56	0 30 26	0 31 59	0 33 44	0 35 26	0 37 10
4	0 18 13	0 19 14	0 20 17	0 21 24	0 22 30	0 23 44	0 25 2	0 26 23	0 27 47	0 29 14	0 30 45	0 32 19	0 34 8	0 35 51	0 37 37
5	0 18 21	0 19 23	0 20 27	0 21 35	0 22 42	0 23 58	0 25 17	0 26 39	0 28 4	0 29 33	0 31 5	0 32 41	0 34 32	0 36 17	0 38 5
6	0 18 29	0 19 32	0 20 37	0 21 47	0 22 55	0 24 12	0 25 33	0 26 56	0 28 22	0 29 53	0 31 26	0 33 4	0 34 56	0 36 43	0 38 33
7	0 18 37	0 19 41	0 20 48	0 21 59	0 23 9	0 24 27	0 25 49	0 27 14	0 28 41	0 30 14	0 31 49	0 33 29	0 35 21	0 37 10	0 39 2
8	0 18 46	0 19 50	0 20 59	0 22 11	0 23 23	0 24 43	0 26 6	0 27 33	0 29 2	0 30 37	0 32 14	0 33 56	0 35 47	0 37 38	0 39 32
9	0 18 55	0 20 0	0 21 10	0 22 23	0 23 38	0 24 59	0 26 24	0 27 53	0 29 24	0 31 1	0 32 40	0 34 24	0 36 14	0 38 7	0 40 3
10	0 19 4	0 20 10	0 21 21	0 22 35	0 23 53	0 25 16	0 26 42	0 28 13	0 29 47	0 31 26	0 33 7	0 34 53	0 36 42	0 38 37	0 40 35
11	0 19 14	0 20 21	0 21 33	0 22 48	0 24 8	0 25 33	0 27 1	0 28 34	0 30 10	0 31 51	0 33 34	0 35 22	0 37 10	0 39 7	0 41 7
12	0 19 25	0 20 33	0 21 46	0 23 3	0 24 24	0 25 51	0 27 21	0 28 56	0 30 34	0 32 17	0 34 2	0 35 53	0 37 41	0 39 40	0 41 42
13	0 19 37	0 20 46	0 22 0	0 23 19	0 24 41	0 26 10	0 27 42	0 29 19	0 30 59	0 32 44	0 34 31	0 36 25	0 38 14	0 40 15	0 42 19
14	0 19 50	0 21 0	0 22 16	0 23 36	0 24 59	0 26 30	0 28 4	0 29 43	0 31 25	0 33 12	0 35 1	0 36 58	0 38 49	0 40 52	0 42 58
15	0 20 4	0 21 15	0 22 33	0 23 55	0 25 19	0 26 51	0 28 27	0 30 8	0 31 52	0 33 42	0 35 33	0 37 33	0 39 26	0 41 31	0 43 40
16	0 20 19	0 21 31	0 22 51	0 24 15	0 25 41	0 27 14	0 28 51	0 30 34	0 32 21	0 34 14	0 36 7	0 38 10	0 40 5	0 42 13	0 44 25
17	0 20 34	0 21 48	0 23 10	0 24 36	0 26 4	0 27 39	0 29 17	0 31 2	0 32 51	0 34 47	0 36 42	0 38 48	0 40 46	0 42 57	0 45 12
18	0 20 50	0 22 6	0 23 30	0 24 58	0 26 28	0 28 5	0 29 45	0 31 32	0 33 23	0 35 22	0 37 19	0 39 28	0 41 29	0 43 43	0 46 1
19	0 21 6	0 22 25	0 23 50	0 25 20	0 26 53	0 28 32	0 30 15	0 32 4	0 33 57	0 35 59	0 37 58	0 40 10	0 42 15	0 44 32	0 46 53
20	0 21 22	0 22 44	0 24 11	0 25 43	0 27 19	0 29 0	0 30 46	0 32 37	0 34 33	0 36 38	0 38 39	0 40 54	0 43 4	0 45 24	0 47 42
21	0 21 39	0 23 3	0 24 32	0 26 6	0 27 45	0 29 29	0 31 18	0 33 12	0 35 11	0 37 18	0 39 24	0 41 41	0 43 56	0 46 19	0 48 46
22	0 21 56	0 23 23	0 24 54	0 26 30	0 28 12	0 29 59	0 31 51	0 33 48	0 35 50	0 37 59	0 40 11	0 42 30	0 44 50	0 47 16	0 49 47
23	0 22 14	0 23 43	0 25 16	0 26 55	0 28 39	0 30 29	0 32 24	0 34 25	0 36 31	0 38 42	0 41 0	0 43 21	0 45 47	0 48 17	0 50 51

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 17 41	0 18 38	0 19 37	0 20 40	0 21 46	0 22 56	0 24 9	0 25 26	0 26 45	0 28 8	0 29 35	0 31 5	0 32 38	0 34 14	0 35 54
1	0 17 27	0 18 23	0 19 21	0 20 23	0 21 28	0 22 36	0 23 48	0 25 2	0 26 20	0 27 42	0 29 7	0 30 35	0 32 7	0 33 36	0 35 14
2	0 17 14	0 18 9	0 19 6	0 20 7	0 21 10	0 22 17	0 23 27	0 24 40	0 25 56	0 27 17	0 28 40	0 30 6	0 31 37	0 33 1	0 34 37
3	0 17 1	0 17 55	0 18 51	0 19 51	0 20 53	0 21 58	0 23 7	0 24 19	0 25 33	0 26 53	0 28 14	0 29 39	0 31 8	0 32 29	0 34 3
4	0 16 49	0 17 42	0 18 37	0 19 36	0 20 36	0 21 40	0 22 48	0 23 59	0 25 12	0 26 30	0 27 50	0 29 13	0 30 40	0 32 0	0 33 32
5	0 16 37	0 17 29	0 18 23	0 19 21	0 20 20	0 21 23	0 22 30	0 23 40	0 24 52	0 26 8	0 27 26	0 28 48	0 30 13	0 31 32	0 33 2
6	0 16 26	0 17 17	0 18 10	0 19 7	0 20 5	0 21 7	0 22 13	0 23 22	0 24 33	0 25 47	0 27 4	0 28 25	0 29 48	0 31 6	0 32 35
7	0 16 16	0 17 6	0 17 58	0 18 54	0 19 51	0 20 52	0 21 57	0 23 5	0 24 15	0 25 28	0 26 44	0 28 4	0 29 26	0 30 42	0 32 10
8	0 16 6	0 16 55	0 17 47	0 18 42	0 19 38	0 20 38	0 21 42	0 22 49	0 23 58	0 25 10	0 26 25	0 27 44	0 29 5	0 30 21	0 31 48
9	0 15 57	0 16 45	0 17 36	0 18 30	0 19 26	0 20 25	0 21 28	0 22 34	0 23 42	0 24 53	0 26 7	0 27 25	0 28 45	0 30 3	0 31 29
10	0 15 49	0 16 36	0 17 26	0 18 19	0 19 15	0 20 13	0 21 15	0 22 20	0 23 27	0 24 37	0 25 50	0 27 7	0 28 26	0 29 48	0 31 13
11	0 15 41	0 16 27	0 17 17	0 18 9	0 19 5	0 20 2	0 21 3	0 22 7	0 23 13	0 24 22	0 25 34	0 26 50	0 28 8	0 29 35	0 30 59
12	0 15 33	0 16 18	0 17 8	0 18 0	0 18 54	0 19 51	0 20 52	0 21 55	0 23 0	0 24 8	0 25 19	0 26 34	0 27 51	0 29 21	0 30 44
13	0 15 25	0 16 9	0 16 59	0 17 50	0 18 43	0 19 40	0 20 41	0 21 43	0 22 48	0 23 55	0 25 5	0 26 19	0 27 35	0 29 6	0 30 28
14	0 15 16	0 16 0	0 16 49	0 17 40	0 18 32	0 19 39	0 20 30	0 21 31	0 22 36	0 23 43	0 24 52	0 26 5	0 27 20	0 28 49	0 30 10
15	0 15 7	0 15 51	0 16 39	0 17 30	0 18 21	0 19 28	0 20 19	0 21 19	0 22 23	0 23 30	0 24 39	0 25 52	0 27 6	0 28 31	0 29 51
16	0 14 58	0 15 41	0 16 29	0 17 20	0 18 10	0 19 17	0 20 7	0 21 6	0 22 10	0 23 17	0 24 26	0 25 38	0 26 51	0 28 13	0 29 32
17	0 14 48	0 15 31	0 16 18	0 17 9	0 17 59	0 19 5	0 19 54	0 20 52	0 21 56	0 23 2	0 24 11	0 25 22	0 26 35	0 27 54	0 29 12
18	0 14 37	0 15 20	0 16 7	0 16 57	0 17 47	0 18 52	0 19 40	0 20 38	0 21 41	0 22 46	0 23 54	0 25 5	0 26 17	0 27 34	0 28 51
19	0 14 25	0 15 8	0 15 55	0 16 44	0 17 34	0 18 38	0 19 25	0 20 23	0 21 25	0 22 29	0 23 36	0 25 46	0 25 58	0 27 13	0 28 29
20	0 14 13	0 14 56	0 15 42	0 16 30	0 17 20	0 18 13	0 19 9	0 20 7	0 21 8	0 22 11	0 23 17	0 24 26	0 25 37	0 26 51	0 28 7
21	0 14 0	0 14 43	0 15 28	0 16 15	0 17 5	0 17 57	0 18 52	0 19 50	0 20 50	0 21 52	0 22 57	0 24 5	0 25 15	0 26 28	0 27 44
22	0 13 46	0 14 29	0 15 13	0 16 0	0 16 49	0 17 40	0 18 35	0 19 32	0 20 31	0 21 32	0 22 37	0 23 44	0 24 53	0 26 5	0 27 20
23	0 13 32	0 14 14	0 14 57	0 15 44	0 16 32	0 17 23	0 18 17	0 19 13	0 20 11	0 21 12	0 22 16	0 23 22	0 24 30	0 25 41	0 26 55

LATITUDE 49° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 37 37	0 39 23	0 41 17	0 43 6	0 45 3	0 47 2	0 49 5	0 51 11	0 53 21	0 55 34	0 57 49	1 0 9	1 2 31	1 4 57	1 7 26
1	0 38 2	0 39 50	0 41 45	0 43 36	0 45 35	0 47 36	0 49 41	0 51 49	0 54 2	0 56 16	0 58 33	1 0 55	1 3 19	1 5 48	1 8 19
2	0 38 28	0 40 18	0 42 14	0 44 7	0 46 8	0 48 11	0 50 18	0 52 28	0 54 44	0 56 59	0 59 18	1 1 42	1 4 9	1 6 41	1 9 14
3	0 38 56	0 40 47	0 42 44	0 44 39	0 46 42	0 48 47	0 50 56	0 53 8	0 55 27	0 57 43	1 0 4	1 2 30	1 5 1	1 7 35	1 10 10
4	0 39 25	0 41 17	0 43 15	0 45 12	0 47 17	0 49 24	0 51 35	0 53 49	0 56 10	0 58 28	1 0 51	1 3 19	1 5 55	1 8 31	1 11 8
5	0 39 55	0 41 48	0 43 47	0 45 46	0 47 53	0 50 2	0 52 15	0 54 31	0 56 54	0 59 14	1 1 39	1 4 10	1 6 50	1 9 28	1 12 8
6	0 40 25	0 42 20	0 44 21	0 46 22	0 48 31	0 50 42	0 52 57	0 55 15	0 57 40	1 0 2	1 2 29	1 5 2	1 7 45	1 10 26	1 13 9
7	0 40 56	0 42 53	0 44 56	0 47 0	0 49 11	0 51 24	0 53 41	0 56 1	0 58 29	1 0 53	1 3 22	1 5 57	1 8 42	1 11 25	1 14 11
8	0 41 28	0 43 27	0 45 32	0 47 39	0 49 52	0 52 8	0 54 27	0 56 49	0 59 20	1 1 46	1 4 16	1 6 54	1 9 41	1 12 26	1 15 15
9	0 42 1	0 44 2	0 46 9	0 48 19	0 50 34	0 52 53	0 55 14	0 57 39	1 0 13	1 2 41	1 5 13	1 7 54	1 10 42	1 13 29	1 16 21
10	0 42 35	0 44 38	0 46 47	0 49 0	0 51 17	0 53 39	0 56 3	0 58 30	1 1 7	1 3 38	1 6 14	1 8 58	1 11 45	1 14 35	1 17 30
11	0 43 10	0 45 16	0 47 27	0 49 43	0 52 3	0 54 27	0 56 54	0 59 24	1 2 4	1 4 39	1 7 18	1 10 5	1 12 51	1 15 45	1 18 44
12	0 43 47	0 45 56	0 48 10	0 50 29	0 52 51	0 55 18	0 57 48	1 0 21	1 3 4	1 5 42	1 8 24	1 11 14	1 14 1	1 16 59	1 20 1
13	0 44 27	0 46 39	0 48 55	0 51 17	0 53 42	0 56 11	0 58 44	1 1 20	1 4 6	1 6 48	1 9 34	1 12 27	1 15 16	1 18 17	1 21 23
14	0 45 9	0 47 24	0 49 43	0 52 8	0 54 36	0 57 7	0 59 43	1 2 22	1 5 11	1 7 57	1 10 47	1 13 43	1 16 36	1 19 40	1 22 49
15	0 45 54	0 48 12	0 50 33	0 53 1	0 55 32	0 58 6	1 0 45	1 3 27	1 6 19	1 9 9	1 12 3	1 15 2	1 17 59	1 21 7	1 24 19
16	0 46 42	0 49 3	0 51 26	0 53 57	0 56 31	0 59 8	1 1 50	1 4 35	1 7 30	1 10 24	1 13 22	1 16 24	1 19 26	1 22 37	1 25 53
17	0 47 32	0 49 56	0 52 22	0 54 56	0 57 33	1 0 13	1 2 58	1 5 46	1 8 44	1 11 42	1 14 44	1 17 50	1 20 57	1 24 12	1 27 32
18	0 48 24	0 50 51	0 53 21	0 55 58	0 58 38	1 1 21	1 4 9	1 7 1	1 10 2	1 13 4	1 16 10	1 19 20	1 22 32	1 25 51	1 29 15
19	0 49 19	0 51 49	0 54 23	0 57 3	0 59 46	1 2 33	1 5 24	1 8 20	1 11 24	1 14 31	1 17 41	1 20 55	1 24 12	1 27 35	1 31 3
20	0 50 17	0 52 50	0 55 28	0 58 12	1 0 58	1 3 49	1 6 44	1 9 45	1 12 51	1 16 3	1 19 17	1 22 35	1 25 58	1 29 25	1 32 57
21	0 51 18	0 53 55	0 56 37	0 59 25	1 2 15	1 5 10	1 8 9	1 11 14	1 14 24	1 17 40	1 20 59	1 24 22	1 27 50	1 31 22	1 34 59
22	0 52 23	0 55 4	0 57 50	1 0 42	1 3 37	1 6 36	1 9 40	1 12 49	1 16 4	1 19 24	1 22 48	1 26 16	1 29 49	1 33 27	1 37 9
23	0 53 31	0 56 17	0 59 8	1 2 5	1 5 5	1 8 9	1 11 18	1 14 32	1 17 51	1 21 16	1 24 45	1 28 19	1 31 57	1 35 40	1 39 28

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 37 37	0 39 23	0 41 17	0 43 6	0 45 3	0 47 2	0 49 5	0 51 11	0 53 21	0 55 34	0 57 49	1 0 9	1 2 31	1 4 57	1 7 20
1	0 36 55	0 38 39	0 40 30	0 42 24	0 44 19	0 46 17	0 48 18	0 50 22	0 52 30	0 54 37	0 57 2	0 59 19	1 1 39	1 4 3	1 6 30
2	0 36 16	0 37 58	0 39 47	0 41 44	0 43 37	0 45 34	0 47 33	0 49 35	0 51 41	0 53 42	0 56 17	0 58 31	1 0 49	1 3 11	1 5 36
3	0 35 40	0 37 20	0 39 7	0 41 6	0 42 57	0 44 53	0 46 50	0 48 50	0 50 54	0 52 50	0 55 33	0 57 45	1 0 1	1 2 21	1 4 44
4	0 35 7	0 36 45	0 38 30	0 40 30	0 42 19	0 44 13	0 46 8	0 48 6	0 50 8	0 52 0	0 54 50	0 57 0	0 59 14	1 1 32	1 3 53
5	0 34 35	0 36 11	0 37 54	0 39 55	0 41 42	0 43 34	0 45 27	0 47 23	0 49 23	0 51 12	0 54 8	0 56 16	0 58 28	1 0 44	1 3 3
6	0 34 6	0 35 41	0 37 22	0 39 20	0 41 6	0 42 56	0 44 47	0 46 41	0 48 39	0 50 28	0 53 27	0 55 33	0 57 43	0 59 57	1 2 14
7	0 33 40	0 35 14	0 36 53	0 38 47	0 40 31	0 42 19	0 44 8	0 46 1	0 47 57	0 49 47	0 52 47	0 54 51	0 56 59	0 59 11	1 1 27
8	0 33 17	0 34 50	0 36 27	0 38 16	0 39 58	0 41 44	0 43 31	0 45 23	0 47 17	0 49 8	0 52 8	0 54 10	0 56 16	0 58 27	1 0 41
9	0 32 57	0 34 29	0 36 4	0 37 47	0 39 27	0 41 11	0 42 57	0 44 47	0 46 40	0 48 32	0 51 30	0 53 30	0 55 35	0 57 44	0 59 56
10	0 32 40	0 34 11	0 35 44	0 37 20	0 38 59	0 40 41	0 42 26	0 44 14	0 46 5	0 47 58	0 50 53	0 52 51	0 54 55	0 57 2	0 59 13
11	0 32 25	0 33 56	0 35 28	0 36 55	0 38 33	0 40 13	0 41 57	0 43 44	0 45 34	0 47 26	0 50 17	0 52 13	0 54 16	0 56 21	0 58 30
12	0 32 9	0 33 40	0 35 11	0 36 32	0 38 9	0 39 48	0 41 31	0 43 16	0 45 5	0 46 56	0 49 41	0 51 35	0 53 37	0 55 41	0 57 48
13	0 31 52	0 33 22	0 34 52	0 36 11	0 37 47	0 39 25	0 41 7	0 42 50	0 44 38	0 46 28	0 49 5	0 50 58	0 52 59	0 55 2	0 57 7
14	0 31 34	0 33 3	0 34 32	0 35 52	0 37 27	0 39 4	0 40 45	0 42 27	0 44 13	0 46 2	0 48 29	0 50 21	0 52 21	0 54 23	0 56 27
15	0 31 15	0 32 43	0 34 11	0 35 34	0 37 8	0 38 44	0 40 24	0 42 5	0 43 50	0 45 37	0 47 53	0 49 44	0 51 43	0 53 44	0 55 47
16	0 30 55	0 32 22	0 33 49	0 35 14	0 36 48	0 38 23	0 40 2	0 41 42	0 43 26	0 45 13	0 47 18	0 49 8	0 51 5	0 53 4	0 55 6
17	0 30 34	0 32 0	0 33 26	0 34 53	0 36 26	0 38 0	0 39 38	0 41 17	0 43 0	0 44 47	0 46 43	0 48 32	0 50 27	0 52 24	0 54 24
18	0 30 12	0 31 37	0 33 2	0 34 30	0 36 2	0 37 35	0 39 12	0 40 50	0 42 32	0 44 18	0 46 7	0 47 55	0 49 48	0 51 43	0 53 41
19	0 29 49	0 31 13	0 32 37	0 34 5	0 35 36	0 37 8	0 38 44	0 40 21	0 42 2	0 43 46	0 45 31	0 47 18	0 49 9	0 51 2	0 52 58
20	0 29 26	0 30 48	0 32 12	0 33 38	0 35 8	0 36 39	0 38 14	0 39 50	0 41 30	0 43 12	0 44 55	0 46 41	0 48 30	0 50 21	0 52 15
21	0 29 1	0 30 23	0 31 45	0 33 10	0 34 39	0 36 9	0 37 42	0 39 18	0 40 56	0 42 37	0 44 19	0 46 3	0 47 51	0 49 40	0 51 33
22	0 28 36	0 29 56	0 31 18	0 32 42	0 34 9	0 35 38	0 37 10	0 38 45	0 40 21	0 42 1	0 43 42	0 45 25	0 47 11	0 48 59	0 50 49
23	0 28 10	0 29 29	0 30 50	0 32 13	0 33 39	0 35 7	0 36 37	0 38 11	0 39 46	0 41 24	0 43 4	0 44 46	0 46 30	0 48 17	0 50 6

LATITUDE 49° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 9 58	1 12 33	1 15 12	1 17 53	1 20 38	1 23 26	1 26 17	1 29 12	1 32 9	1 35 10	1 38 13	1 41 20	1 44 30	1 47 43	1 50 59
1	1 10 53	1 13 30	1 16 11	1 18 55	1 21 42	1 24 32	1 27 25	1 30 23	1 33 22	1 36 26	1 39 32	1 42 38	1 45 51	1 49 7	1 52 26
2	1 11 50	1 14 29	1 17 12	1 19 59	1 22 48	1 25 40	1 28 36	1 31 36	1 34 38	1 37 45	1 40 54	1 43 59	1 47 15	1 50 34	1 53 56
3	1 12 49	1 15 30	1 18 15	1 21 5	1 23 56	1 26 51	1 29 49	1 32 52	1 35 57	1 39 7	1 42 19	1 45 24	1 48 43	1 52 5	1 55 30
4	1 13 50	1 16 34	1 19 21	1 22 13	1 25 7	1 28 4	1 31 5	1 34 11	1 37 18	1 40 31	1 43 46	1 46 53	1 50 15	1 53 40	1 57 8
5	1 14 53	1 17 40	1 20 29	1 23 23	1 26 20	1 29 19	1 32 23	1 35 32	1 38 42	1 41 57	1 45 15	1 48 26	1 51 51	1 55 19	1 58 50
6	1 15 57	1 18 47	1 21 39	1 24 35	1 27 35	1 30 37	1 33 43	1 36 55	1 40 8	1 43 25	1 46 46	1 50 2	1 53 30	1 57 1	2 0 35
7	1 17 2	1 19 55	1 22 50	1 25 49	1 28 52	1 31 57	1 35 6	1 38 20	1 41 36	1 44 55	1 48 19	1 51 42	1 55 13	1 58 47	2 2 24
8	1 18 9	1 21 5	1 24 3	1 27 5	1 30 11	1 33 19	1 36 31	1 39 48	1 43 7	1 46 29	1 49 56	1 53 25	1 56 59	2 0 37	2 4 17
9	1 19 18	1 22 17	1 25 18	1 28 23	1 31 32	1 34 44	1 38 0	1 41 20	1 44 43	1 48 8	1 51 38	1 55 12	1 58 50	2 2 31	2 6 15
10	1 20 30	1 23 32	1 26 36	1 29 44	1 32 56	1 36 12	1 39 33	1 42 57	1 46 24	1 49 53	1 53 26	1 57 4	2 0 46	2 4 31	2 8 18
11	1 21 47	1 24 52	1 28 0	1 31 9	1 34 25	1 37 45	1 41 11	1 44 39	1 48 10	1 51 43	1 55 20	1 59 1	2 2 47	2 6 36	2 10 27
12	1 23 7	1 26 16	1 29 28	1 32 39	1 35 59	1 39 23	1 42 53	1 46 25	1 50 0	1 53 37	1 57 18	2 1 3	2 4 53	2 8 46	2 12 41
13	1 24 32	1 27 45	1 31 1	1 34 14	1 37 38	1 41 6	1 44 40	1 48 16	1 51 55	1 55 36	1 59 21	2 3 10	2 7 4	2 11 1	2 15 0
14	1 26 1	1 29 18	1 32 39	1 35 54	1 39 22	1 42 54	1 46 32	1 50 12	1 53 55	1 57 40	2 1 30	2 5 22	2 9 20	2 13 21	2 17 25
15	1 27 35	1 30 56	1 34 21	1 37 40	1 41 12	1 44 47	1 48 29	1 52 13	1 56 0	1 59 49	2 3 44	2 7 40	2 11 42	2 15 47	2 19 56
16	1 29 13	1 32 38	1 36 7	1 39 31	1 43 7	1 46 45	1 50 31	1 54 19	1 58 11	2 2 4	2 6 3	2 10 4	2 14 10	2 18 19	2 22 33
17	1 30 56	1 34 25	1 37 58	1 41 27	1 45 7	1 48 48	1 52 38	1 56 30	2 0 27	2 4 25	2 8 28	2 12 34	2 16 44	2 20 58	2 25 17
18	1 32 43	1 36 16	1 39 53	1 43 28	1 47 12	1 50 58	1 54 51	1 58 47	2 2 49	2 6 52	2 11 0	2 15 11	2 19 26	2 23 45	2 28 9
19	1 34 35	1 38 12	1 41 53	1 45 35	1 49 24	1 53 15	1 57 11	2 1 12	2 5 19	2 9 27	2 13 40	2 17 56	2 22 16	2 26 41	2 31 10
20	1 36 35	1 40 14	1 44 0	1 47 50	1 51 43	1 55 39	1 59 40	2 3 46	2 7 58	2 12 12	2 16 30	2 20 51	2 25 16	2 29 46	2 34 20
21	1 38 40	1 42 26	1 46 17	1 50 12	1 54 11	1 58 12	2 2 18	2 6 29	2 10 46	2 15 6	2 19 30	2 23 57	2 28 28	2 33 3	2 37 42
22	1 40 55	1 44 46	1 48 42	1 52 42	1 56 47	2 0 54	2 5 6	2 9 23	2 13 45	2 18 11	2 22 41	2 27 14	2 31 51	2 36 32	2 41 17
23	1 43 20	1 47 17	1 51 18	1 55 24	1 59 35	2 3 49	2 8 7	2 12 30	2 16 58	2 21 31	2 26 7	2 30 46	2 35 29	2 40 15	2 45 6

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 9 58	1 12 33	1 15 12	1 17 53	1 20 38	1 23 26	1 26 17	1 29 12	1 32 9	1 35 10	1 38 13	1 41 20	1 44 30	1 47 43	1 50 59
1	1 9 0	1 11 34	1 14 10	1 16 49	1 19 32	1 22 16	1 25 5	1 27 58	1 30 53	1 33 52	1 36 52	1 39 56	1 43 4	1 46 14	1 49 28
2	1 8 4	1 10 36	1 13 9	1 15 46	1 18 27	1 21 8	1 23 55	1 26 46	1 29 39	1 32 36	1 35 32	1 38 34	1 41 40	1 44 47	1 47 59
3	1 7 10	1 9 39	1 12 9	1 14 44	1 17 23	1 20 2	1 22 47	1 25 36	1 28 27	1 31 21	1 34 14	1 37 14	1 40 18	1 43 22	1 46 32
4	1 6 17	1 8 43	1 11 11	1 13 44	1 16 21	1 18 58	1 21 41	1 24 27	1 27 16	1 30 8	1 32 58	1 35 56	1 38 58	1 41 59	1 45 6
5	1 5 25	1 7 49	1 10 15	1 12 46	1 15 21	1 17 56	1 20 37	1 23 20	1 26 7	1 28 56	1 31 43	1 34 39	1 37 39	1 40 38	1 43 42
6	1 4 34	1 6 57	1 9 21	1 11 50	1 14 22	1 16 55	1 19 34	1 22 15	1 25 0	1 27 46	1 30 31	1 33 24	1 36 22	1 39 19	1 42 20
7	1 3 45	1 6 7	1 8 29	1 10 55	1 13 25	1 15 56	1 18 33	1 21 12	1 23 55	1 26 38	1 29 21	1 32 11	1 35 7	1 38 2	1 41 0
8	1 2 58	1 5 18	1 7 38	1 10 2	1 12 30	1 14 59	1 17 34	1 20 11	1 22 51	1 25 32	1 28 14	1 31 1	1 33 54	1 36 47	1 39 43
9	1 2 12	1 4 30	1 6 48	1 9 10	1 11 36	1 14 4	1 16 37	1 19 12	1 21 49	1 24 28	1 27 9	1 29 54	1 32 44	1 35 35	1 38 29
10	1 1 27	1 3 43	1 6 0	1 8 20	1 10 44	1 13 11	1 15 42	1 18 15	1 20 49	1 23 26	1 26 6	1 28 49	1 31 36	1 34 25	1 37 17
11	1 0 42	1 2 57	1 5 13	1 7 31	1 9 53	1 12 19	1 14 48	1 17 18	1 19 50	1 22 25	1 25 4	1 27 45	1 30 29	1 33 16	1 36 6
12	0 59 58	1 2 11	1 4 26	1 6 42	1 9 2	1 11 27	1 13 54	1 16 21	1 18 51	1 21 25	1 24 2	1 26 41	1 29 23	1 32 8	1 34 56
13	0 59 15	1 1 25	1 3 39	1 5 53	1 8 12	1 10 35	1 13 0	1 15 25	1 17 53	1 20 26	1 23 1	1 25 38	1 28 17	1 31 0	1 33 46
14	0 58 33	1 0 39	1 2 52	1 5 4	1 7 22	1 9 43	1 12 6	1 14 29	1 16 56	1 19 27	1 22 0	1 24 35	1 27 12	1 29 53	1 32 37
15	0 57 52	0 59 54	1 2 5	1 4 15	1 6 32	1 8 51	1 11 12	1 13 33	1 15 59	1 18 28	1 20 59	1 23 32	1 26 7	1 28 46	1 31 28
16	0 57 10	0 59 9	1 1 18	1 3 26	1 5 42	1 7 59	1 10 18	1 12 37	1 15 2	1 17 29	1 19 58	1 22 29	1 25 2	1 27 39	1 30 19
17	0 56 26	0 58 24	1 0 31	1 2 37	1 4 52	1 7 7	1 9 24	1 11 41	1 14 5	1 16 30	1 18 57	1 21 26	1 23 57	1 26 32	1 29 10
18	0 55 41	0 57 39	0 59 44	1 1 49	1 4 2	1 6 15	1 8 30	1 10 46	1 13 8	1 15 31	1 17 56	1 20 23	1 22 52	1 25 25	1 28 1
19	0 54 56	0 56 54	0 58 57	1 1 1	1 3 12	1 5 23	1 7 36	1 9 51	1 12 11	1 14 32	1 16 55	1 19 20	1 21 47	1 24 18	1 26 52
20	0 54 11	0 56 9	0 58 10	1 0 13	1 2 22	1 4 31	1 6 42	1 8 56	1 11 14	1 13 33	1 15 54	1 18 17	1 20 43	1 23 12	1 25 44
21	0 53 26	0 55 23	0 57 23	0 59 25	1 1 32	1 3 39	1 5 48	1 8 1	1 10 17	1 12 34	1 14 53	1 17 15	1 19 39	1 22 6	1 24 36
22	0 52 43	0 54 37	0 56 36	0 58 37	1 0 42	1 2 47	1 4 55	1 7 6	1 9 20	1 11 35	1 13 53	1 16 13	1 18 36	1 21 1	1 23 29
23	0 51 58	0 53 52	0 55 49	0 57 49	0 59 52	1 1 56	1 4 2	1 6 11	1 8 23	1 10 37	1 12 53	1 15 12	1 17 33	1 19 56	1 22 22

LATITUDE 50° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 8	0 10 14	0 10 22	0 10 33	0 10 48	0 11 7	0 11 28	0 11 53	0 12 21	0 12 52	0 13 26	0 14 5	0 14 46	0 15 30	0 16 18
1	0 10 10	0 10 16	0 10 25	0 10 36	0 10 51	0 11 9	0 11 32	0 11 56	0 12 25	0 12 56	0 13 31	0 14 11	0 14 52	0 15 37	0 16 26
2	0 10 12	0 10 18	0 10 28	0 10 39	0 10 54	0 11 12	0 11 36	0 11 59	0 12 29	0 13 0	0 13 36	0 14 17	0 14 58	0 15 44	0 16 34
3	0 10 14	0 10 20	0 10 30	0 10 42	0 10 57	0 11 15	0 11 40	0 12 2	0 12 33	0 13 5	0 13 41	0 14 23	0 15 4	0 15 51	0 16 42
4	0 10 16	0 10 22	0 10 32	0 10 45	0 11 0	0 11 18	0 11 43	0 12 6	0 12 37	0 13 10	0 13 46	0 14 29	0 15 10	0 15 58	0 16 50
5	0 10 18	0 10 24	0 10 34	0 10 47	0 11 3	0 11 21	0 11 46	0 12 10	0 12 41	0 13 15	0 13 51	0 14 35	0 15 16	0 16 5	0 16 58
6	0 10 20	0 10 26	0 10 36	0 10 49	0 11 6	0 11 24	0 11 49	0 12 14	0 12 45	0 13 20	0 13 56	0 14 41	0 15 23	0 16 13	0 17 6
7	0 10 22	0 10 28	0 10 38	0 10 51	0 11 9	0 11 27	0 11 52	0 12 18	0 12 49	0 13 25	0 14 2	0 14 47	0 15 30	0 16 21	0 17 14
8	0 10 24	0 10 30	0 10 40	0 10 53	0 11 11	0 11 30	0 11 55	0 12 22	0 12 53	0 13 30	0 14 8	0 14 53	0 15 37	0 16 29	0 17 23
9	0 10 26	0 10 32	0 10 42	0 10 55	0 11 13	0 11 33	0 11 58	0 12 26	0 12 58	0 13 35	0 14 14	0 14 59	0 15 45	0 16 37	0 17 32
10	0 10 28	0 10 34	0 10 44	0 10 57	0 11 15	0 11 36	0 12 1	0 12 30	0 13 3	0 13 40	0 14 20	0 15 5	0 15 53	0 16 45	0 17 41
11	0 10 30	0 10 36	0 10 46	0 10 59	0 11 17	0 11 39	0 12 4	0 12 34	0 13 8	0 13 46	0 14 26	0 15 12	0 16 2	0 16 54	0 17 51
12	0 10 32	0 10 38	0 10 48	0 11 1	0 11 19	0 11 42	0 12 7	0 12 38	0 13 13	0 13 52	0 14 33	0 15 20	0 16 11	0 17 3	0 18 1
13	0 10 34	0 10 40	0 10 50	0 11 3	0 11 21	0 11 45	0 12 11	0 12 42	0 13 18	0 13 58	0 14 40	0 15 28	0 16 20	0 17 12	0 18 12
14	0 10 36	0 10 42	0 10 52	0 11 5	0 11 24	0 11 48	0 12 15	0 12 46	0 13 23	0 14 4	0 14 47	0 15 36	0 16 29	0 17 22	0 18 23
15	0 10 38	0 10 44	0 10 54	0 11 7	0 11 27	0 11 51	0 12 19	0 12 50	0 13 28	0 14 10	0 14 54	0 15 44	0 16 38	0 17 32	0 18 35
16	0 10 40	0 10 46	0 10 56	0 11 9	0 11 30	0 11 54	0 12 23	0 12 54	0 13 33	0 14 16	0 15 1	0 15 52	0 16 47	0 17 42	0 18 47
17	0 10 42	0 10 48	0 10 58	0 11 11	0 11 33	0 11 57	0 12 27	0 12 59	0 13 38	0 14 22	0 15 8	0 16 0	0 16 56	0 17 52	0 18 59
18	0 10 43	0 10 50	0 11 0	0 11 14	0 11 36	0 12 0	0 12 31	0 13 4	0 13 43	0 14 28	0 15 15	0 16 8	0 17 5	0 18 3	0 19 11
19	0 10 44	0 10 51	0 11 2	0 11 17	0 11 39	0 12 4	0 12 35	0 13 9	0 13 49	0 14 34	0 15 22	0 16 16	0 17 14	0 18 14	0 19 23
20	0 10 45	0 10 52	0 11 4	0 11 20	0 11 42	0 12 8	0 12 39	0 13 14	0 13 55	0 14 40	0 15 29	0 16 24	0 17 23	0 18 25	0 19 35
21	0 10 46	0 10 53	0 11 6	0 11 23	0 11 45	0 12 12	0 12 43	0 13 19	0 14 1	0 14 46	0 15 36	0 16 32	0 17 32	0 18 36	0 19 47
22	0 10 47	0 10 55	0 11 8	0 11 25	0 11 48	0 12 16	0 12 47	0 13 24	0 14 6	0 14 52	0 15 43	0 16 40	0 17 42	0 18 48	0 19 59
23	0 10 49	0 10 57	0 11 10	0 11 27	0 11 50	0 12 19	0 12 51	0 13 28	0 14 11	0 14 58	0 15 51	0 16 49	0 17 52	0 19 0	0 20 13

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 8	0 10 14	0 10 22	0 10 33	0 10 48	0 11 7	0 11 28	0 11 53	0 12 21	0 12 52	0 13 26	0 14 5	0 14 46	0 15 30	0 16 18
1	0 10 5	0 10 11	0 10 19	0 10 30	0 10 45	0 11 3	0 11 24	0 11 49	0 12 16	0 12 47	0 13 21	0 13 59	0 14 39	0 15 23	0 16 10
2	0 10 2	0 10 8	0 10 16	0 10 27	0 10 42	0 10 59	0 11 20	0 11 45	0 12 11	0 12 42	0 13 15	0 13 53	0 14 32	0 15 16	0 16 2
3	0 9 59	0 10 5	0 10 13	0 10 24	0 10 38	0 10 55	0 11 16	0 11 40	0 12 6	0 12 37	0 13 9	0 13 47	0 14 25	0 15 9	0 15 54
4	0 9 56	0 10 2	0 10 10	0 10 20	0 10 34	0 10 51	0 11 12	0 11 35	0 12 1	0 12 32	0 13 3	0 13 41	0 14 18	0 15 2	0 15 46
5	0 9 53	0 9 59	0 10 6	0 10 16	0 10 30	0 10 47	0 11 8	0 11 30	0 11 56	0 12 26	0 12 57	0 13 35	0 14 11	0 14 55	0 15 38
6	0 9 50	0 9 55	0 10 2	0 10 12	0 10 26	0 10 43	0 11 4	0 11 25	0 11 51	0 12 20	0 12 51	0 13 28	0 14 4	0 14 47	0 15 30
7	0 9 47	0 9 51	0 9 58	0 10 8	0 10 22	0 10 39	0 10 59	0 11 20	0 11 46	0 12 14	0 12 45	0 13 21	0 13 57	0 14 39	0 15 22
8	0 9 43	0 9 47	0 9 54	0 10 4	0 10 18	0 10 35	0 10 54	0 11 15	0 11 41	0 12 8	0 12 39	0 13 14	0 13 50	0 14 31	0 15 14
9	0 9 39	0 9 43	0 9 50	0 10 0	0 10 14	0 10 31	0 10 49	0 11 10	0 11 36	0 12 2	0 12 33	0 13 7	0 13 43	0 14 23	0 15 5
10	0 9 35	0 9 39	0 9 46	0 9 56	0 10 9	0 10 26	0 10 44	0 11 5	0 11 30	0 11 56	0 12 27	0 13 0	0 13 36	0 14 15	0 14 56
11	0 9 31	0 9 35	0 9 42	0 9 52	0 10 4	0 10 21	0 10 39	0 11 0	0 11 24	0 11 50	0 12 20	0 12 53	0 13 29	0 14 7	0 14 47
12	0 9 27	0 9 31	0 9 38	0 9 47	0 9 59	0 10 16	0 10 34	0 10 55	0 11 18	0 11 44	0 12 13	0 12 46	0 13 22	0 13 59	0 14 38
13	0 9 22	0 9 26	0 9 33	0 9 42	0 9 54	0 10 11	0 10 28	0 10 49	0 11 12	0 11 37	0 12 6	0 12 38	0 13 14	0 13 51	0 14 29
14	0 9 17	0 9 21	0 9 28	0 9 37	0 9 48	0 10 5	0 10 22	0 10 43	0 11 5	0 11 30	0 11 58	0 12 30	0 13 6	0 13 42	0 14 20
15	0 9 11	0 9 15	0 9 22	0 9 31	0 9 42	0 9 59	0 10 16	0 10 36	0 10 58	0 11 23	0 11 50	0 12 22	0 12 57	0 13 33	0 14 10
16	0 9 5	0 9 9	0 9 16	0 9 25	0 9 36	0 9 53	0 10 9	0 10 29	0 10 51	0 11 15	0 11 42	0 12 14	0 12 48	0 13 24	0 14 0
17	0 8 58	0 9 2	0 9 9	0 9 18	0 9 29	0 9 46	0 10 2	0 10 21	0 10 43	0 11 7	0 11 34	0 12 5	0 12 38	0 13 14	0 13 50
18	0 8 51	0 8 55	0 9 2	0 9 11	0 9 22	0 9 38	0 9 54	0 10 13	0 10 35	0 10 59	0 11 25	0 11 56	0 12 28	0 13 4	0 13 40
19	0 8 43	0 8 47	0 8 54	0 9 3	0 9 14	0 9 29	0 9 45	0 10 4	0 10 26	0 10 50	0 11 16	0 11 46	0 12 18	0 12 53	0 13 29
20	0 8 35	0 8 39	0 8 45	0 8 54	0 9 5	0 9 19	0 9 35	0 9 54	0 10 16	0 10 40	0 11 6	0 11 35	0 12 7	0 12 41	0 13 17
21	0 8 26	0 8 30	0 8 36	0 8 45	0 8 56	0 9 9	0 9 25	0 9 44	0 10 5	0 10 29	0 10 55	0 11 24	0 11 55	0 12 29	0 13 4
22	0 8 15	0 8 19	0 8 25	0 8 34	0 8 45	0 8 58	0 9 14	0 9 32	0 9 53	0 10 17	0 10 43	0 11 11	0 11 42	0 12 15	0 12 50
23	0 8 3	0 8 6	0 8 12	0 8 21	0 8 32	0 8 45	0 9 1	0 9 19	0 9 40	0 10 3	0 10 29	0 10 57	0 11 27	0 12 0	0 12 35

LATITUDE 50° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 17 8	0 18 3	0 19 1	0 20 1	0 21 5	0 22 12	0 23 23	0 24 37	0 25 54	0 27 14	0 28 37	0 30 4	0 31 34	0 33 7	0 34 43
1	0 17 17	0 18 13	0 19 11	0 20 12	0 21 17	0 22 25	0 23 37	0 24 52	0 26 10	0 27 31	0 28 55	0 30 23	0 31 54	0 33 28	0 35 5
2	0 17 26	0 18 23	0 19 21	0 20 23	0 21 29	0 22 38	0 23 51	0 25 7	0 26 26	0 27 48	0 29 13	0 30 43	0 32 15	0 33 50	0 35 28
3	0 17 35	0 18 33	0 19 31	0 20 34	0 21 41	0 22 51	0 24 5	0 25 23	0 26 43	0 28 6	0 29 32	0 31 4	0 32 37	0 34 13	0 35 52
4	0 17 44	0 18 43	0 19 42	0 20 46	0 21 54	0 23 5	0 24 20	0 25 39	0 27 0	0 28 24	0 29 52	0 31 25	0 32 59	0 34 37	0 36 18
5	0 17 53	0 18 53	0 19 53	0 20 58	0 22 7	0 23 19	0 24 35	0 25 56	0 27 18	0 28 43	0 30 13	0 31 47	0 33 22	0 35 2	0 36 45
6	0 18 2	0 19 3	0 20 4	0 21 11	0 22 21	0 23 34	0 24 51	0 26 13	0 27 36	0 29 3	0 30 35	0 32 10	0 33 47	0 35 28	0 37 13
7	0 18 11	0 19 13	0 20 16	0 21 24	0 22 35	0 23 49	0 25 7	0 26 31	0 27 55	0 29 24	0 30 58	0 32 34	0 34 13	0 35 56	0 37 43
8	0 18 21	0 19 23	0 20 28	0 21 37	0 22 49	0 24 5	0 25 24	0 26 49	0 28 15	0 29 46	0 31 22	0 32 59	0 34 40	0 36 25	0 38 14
9	0 18 31	0 19 34	0 20 40	0 21 51	0 23 4	0 24 21	0 25 42	0 27 8	0 28 36	0 30 9	0 31 46	0 33 25	0 35 8	0 36 55	0 38 46
10	0 18 41	0 19 45	0 20 52	0 22 4	0 23 19	0 24 38	0 26 1	0 27 28	0 28 58	0 30 33	0 32 11	0 33 52	0 35 37	0 37 26	0 39 19
11	0 18 52	0 19 57	0 21 5	0 22 18	0 23 35	0 24 55	0 26 20	0 27 48	0 29 20	0 30 57	0 32 37	0 34 20	0 36 7	0 37 58	0 39 53
12	0 19 3	0 20 9	0 21 18	0 22 33	0 23 51	0 25 13	0 26 39	0 28 9	0 29 43	0 31 22	0 33 4	0 34 49	0 36 38	0 38 31	0 40 28
13	0 19 15	0 20 22	0 21 32	0 22 48	0 24 8	0 25 31	0 26 59	0 28 31	0 30 7	0 31 48	0 33 32	0 35 19	0 37 10	0 39 5	0 41 4
14	0 19 27	0 20 35	0 21 47	0 23 4	0 24 25	0 25 50	0 27 20	0 28 54	0 30 32	0 32 14	0 34 0	0 35 49	0 37 42	0 39 39	0 41 40
15	0 19 40	0 20 49	0 22 2	0 23 21	0 24 43	0 26 10	0 27 41	0 29 17	0 30 57	0 32 41	0 34 29	0 36 20	0 38 15	0 40 14	0 42 18
16	0 19 53	0 21 3	0 22 18	0 23 38	0 25 2	0 26 31	0 28 3	0 29 41	0 31 23	0 33 9	0 34 59	0 36 52	0 38 49	0 40 51	0 42 58
17	0 20 6	0 21 18	0 22 34	0 23 56	0 25 21	0 26 52	0 28 26	0 30 6	0 31 50	0 33 38	0 35 30	0 37 25	0 39 25	0 41 30	0 43 40
18	0 20 19	0 21 33	0 22 51	0 24 14	0 25 41	0 27 14	0 28 50	0 30 32	0 32 18	0 34 8	0 36 2	0 38 0	0 40 3	0 42 11	0 44 24
19	0 20 33	0 21 49	0 23 8	0 24 33	0 26 2	0 27 37	0 29 15	0 30 59	0 32 47	0 34 39	0 36 36	0 38 37	0 40 43	0 42 54	0 45 10
20	0 20 47	0 22 5	0 23 26	0 24 53	0 26 24	0 28 1	0 29 41	0 31 27	0 33 17	0 35 12	0 37 12	0 39 16	0 41 25	0 43 39	0 45 58
21	0 21 1	0 22 21	0 23 44	0 25 14	0 26 47	0 28 26	0 30 8	0 31 56	0 33 49	0 35 47	0 37 50	0 39 57	0 42 9	0 44 24	0 46 49
22	0 21 16	0 22 38	0 24 3	0 25 35	0 27 11	0 28 52	0 30 37	0 32 28	0 34 23	0 36 24	0 38 30	0 40 41	0 42 56	0 45 15	0 47 43
23	0 21 31	0 22 55	0 24 23	0 25 57	0 27 35	0 29 19	0 31 8	0 33 2	0 35 1	0 37 5	0 39 14	0 41 29	0 43 48	0 46 12	0 48 42

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 17 8	0 18 3	0 19 1	0 20 1	0 21 5	0 22 12	0 23 23	0 24 37	0 25 54	0 27 14	0 28 37	0 30 4	0 31 34	0 33 7	0 34 43
1	0 17 0	0 17 54	0 18 51	0 19 50	0 20 54	0 22 0	0 23 10	0 24 23	0 25 38	0 26 57	0 28 19	0 29 45	0 31 14	0 32 46	0 34 21
2	0 16 52	0 17 45	0 18 41	0 19 39	0 20 43	0 21 48	0 22 57	0 24 9	0 25 22	0 26 40	0 28 1	0 29 26	0 30 54	0 32 25	0 33 59
3	0 16 44	0 17 36	0 18 31	0 19 28	0 20 31	0 21 36	0 22 44	0 23 55	0 25 6	0 26 23	0 27 43	0 29 7	0 30 34	0 32 4	0 33 37
4	0 16 35	0 17 27	0 18 21	0 19 17	0 20 19	0 21 24	0 22 31	0 23 41	0 24 50	0 26 6	0 27 25	0 28 48	0 30 14	0 31 43	0 33 15
5	0 16 26	0 17 18	0 18 11	0 19 6	0 20 7	0 21 11	0 22 18	0 23 27	0 24 35	0 25 50	0 27 8	0 28 29	0 29 54	0 31 22	0 32 53
6	0 16 17	0 17 8	0 18 1	0 18 55	0 19 55	0 20 58	0 22 4	0 23 12	0 24 20	0 25 34	0 26 51	0 28 11	0 29 34	0 31 1	0 32 31
7	0 16 8	0 16 58	0 17 51	0 18 44	0 19 43	0 20 45	0 21 50	0 22 57	0 24 5	0 25 18	0 26 34	0 27 53	0 29 15	0 30 40	0 32 9
8	0 15 59	0 16 48	0 17 40	0 18 33	0 19 31	0 20 32	0 21 36	0 22 42	0 23 50	0 25 2	0 26 17	0 27 35	0 28 56	0 30 19	0 31 47
9	0 15 50	0 16 38	0 17 29	0 18 22	0 19 19	0 20 19	0 21 22	0 22 27	0 23 35	0 24 46	0 26 0	0 27 17	0 28 37	0 29 59	0 31 25
10	0 15 41	0 16 28	0 17 18	0 18 11	0 19 7	0 20 6	0 21 8	0 22 12	0 23 20	0 24 30	0 25 43	0 26 59	0 28 18	0 29 39	0 31 4
11	0 15 32	0 16 18	0 17 7	0 18 0	0 18 55	0 19 53	0 20 54	0 21 57	0 23 5	0 24 14	0 25 26	0 26 41	0 27 59	0 29 19	0 30 43
12	0 15 23	0 16 8	0 16 56	0 17 49	0 18 43	0 19 40	0 20 40	0 21 42	0 22 50	0 23 58	0 25 9	0 26 23	0 27 40	0 28 59	0 30 22
13	0 15 13	0 15 58	0 16 45	0 17 38	0 18 31	0 19 27	0 20 26	0 21 27	0 22 34	0 23 41	0 24 52	0 26 5	0 27 21	0 28 39	0 30 1
14	0 15 3	0 15 48	0 16 34	0 17 26	0 18 19	0 19 14	0 20 12	0 21 12	0 22 18	0 23 24	0 24 35	0 25 47	0 27 2	0 28 19	0 29 40
15	0 14 52	0 15 37	0 16 22	0 17 14	0 18 7	0 19 1	0 19 58	0 20 57	0 22 2	0 23 7	0 24 17	0 25 28	0 26 42	0 27 58	0 29 18
16	0 14 41	0 15 26	0 16 10	0 17 2	0 17 54	0 18 47	0 19 44	0 20 42	0 21 46	0 22 50	0 23 59	0 25 9	0 26 22	0 27 37	0 28 56
17	0 14 30	0 15 15	0 15 58	0 16 49	0 17 41	0 18 33	0 19 30	0 20 27	0 21 30	0 22 33	0 23 41	0 24 50	0 26 2	0 27 16	0 28 34
18	0 14 19	0 15 3	0 15 46	0 16 36	0 17 27	0 18 19	0 19 15	0 20 12	0 21 14	0 22 16	0 23 23	0 24 31	0 25 42	0 26 55	0 28 12
19	0 14 8	0 14 51	0 15 34	0 16 23	0 17 13	0 18 5	0 19 0	0 19 56	0 20 57	0 21 59	0 23 5	0 24 12	0 25 22	0 26 34	0 27 50
20	0 13 56	0 14 38	0 15 22	0 16 9	0 16 58	0 17 50	0 18 44	0 19 40	0 20 40	0 21 41	0 22 46	0 23 52	0 25 2	0 26 13	0 27 28
21	0 13 43	0 14 24	0 15 8	0 15 54	0 16 43	0 17 34	0 18 27	0 19 23	0 20 22	0 21 22	0 22 26	0 23 32	0 24 41	0 25 51	0 27 5
22	0 13 29	0 14 9	0 14 52	0 15 38	0 16 26	0 17 16	0 18 9	0 19 4	0 20 2	0 21 2	0 22 5	0 23 10	0 24 18	0 25 28	0 26 41
23	0 13 13	0 13 53	0 14 35	0 15 20	0 16 8	0 16 57	0 17 50	0 18 44	0 19 41	0 20 41	0 21 43	0 22 47	0 23 54	0 25 3	0 26 15

LATITUDE 50° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 36 23	0 38 6	0 39 52	0 41 40	0 43 34	0 45 29	0 47 28	0 49 30	0 51 35	0 53 43	0 55 54	0 58 9	1 0 26	1 2 47	1 5 11
1	0 36 46	0 38 30	0 40 17	0 42 8	0 44 3	0 46 3	0 48 3	0 50 6	0 52 14	0 54 24	0 56 37	0 58 54	1 1 13	1 3 36	1 6 2
2	0 37 10	0 38 55	0 40 43	0 42 37	0 44 33	0 46 38	0 48 39	0 50 44	0 52 54	0 55 6	0 57 21	0 59 40	1 2 1	1 4 26	1 6 55
3	0 37 35	0 39 22	0 41 11	0 43 7	0 45 5	0 47 14	0 49 17	0 51 23	0 53 35	0 55 49	0 58 6	1 0 27	1 2 50	1 5 17	1 7 50
4	0 38 2	0 39 50	0 41 41	0 43 39	0 45 39	0 47 51	0 49 56	0 52 4	0 54 18	0 56 34	0 58 53	1 1 16	1 3 41	1 6 10	1 8 46
5	0 38 31	0 40 20	0 42 13	0 44 13	0 46 15	0 48 29	0 50 36	0 52 46	0 55 2	0 57 20	0 59 41	1 2 6	1 4 33	1 7 4	1 9 43
6	0 39 1	0 40 52	0 42 47	0 44 49	0 46 53	0 49 7	0 51 16	0 53 29	0 55 47	0 58 7	1 0 30	1 2 57	1 5 26	1 7 59	1 10 41
7	0 39 33	0 41 26	0 43 23	0 45 27	0 47 33	0 49 47	0 51 58	0 54 13	0 56 33	0 58 55	1 1 20	1 3 49	1 6 20	1 8 56	1 11 40
8	0 40 6	0 42 1	0 44 1	0 46 6	0 48 14	0 50 28	0 52 41	0 54 58	0 57 20	0 59 44	1 2 11	1 4 43	1 7 17	1 9 55	1 12 41
9	0 40 40	0 42 37	0 44 39	0 46 46	0 48 56	0 51 10	0 53 25	0 55 44	0 58 8	1 0 35	1 3 5	1 5 39	1 8 16	1 10 57	1 13 44
10	0 41 15	0 43 14	0 45 18	0 47 27	0 49 39	0 51 53	0 54 11	0 56 32	0 58 58	1 1 28	1 4 1	1 6 38	1 9 18	1 12 2	1 14 49
11	0 41 51	0 43 52	0 45 58	0 48 9	0 50 23	0 52 37	0 54 58	0 57 22	0 59 51	1 2 23	1 4 59	1 7 39	1 10 22	1 13 10	1 15 56
12	0 42 28	0 44 31	0 46 39	0 48 52	0 51 8	0 53 23	0 55 48	0 58 15	1 0 46	1 3 21	1 6 0	1 8 43	1 11 29	1 14 20	1 17 7
13	0 43 6	0 45 11	0 47 21	0 49 36	0 51 55	0 54 12	0 56 40	0 59 10	1 1 44	1 4 22	1 7 3	1 9 49	1 12 38	1 15 32	1 18 22
14	0 43 45	0 45 53	0 48 5	0 50 22	0 52 44	0 55 4	0 57 35	1 0 8	1 2 45	1 5 26	1 8 9	1 10 58	1 13 50	1 16 47	1 19 41
15	0 44 26	0 46 37	0 48 52	0 51 10	0 53 35	0 55 59	0 58 32	1 1 9	1 3 48	1 6 32	1 9 18	1 12 10	1 15 5	1 18 5	1 21 4
16	0 45 9	0 47 23	0 49 41	0 52 1	0 54 29	0 56 56	0 59 32	1 2 12	1 4 54	1 7 41	1 10 30	1 13 25	1 16 24	1 19 27	1 22 31
17	0 45 54	0 48 11	0 50 32	0 52 55	0 55 26	0 57 56	1 0 35	1 3 18	1 6 3	1 8 53	1 11 45	1 14 43	1 17 46	1 20 53	1 24 2
18	0 46 41	0 49 1	0 51 25	0 53 51	0 56 25	0 58 59	1 1 41	1 4 27	1 7 15	1 10 8	1 13 4	1 16 5	1 19 12	1 22 23	1 25 37
19	0 47 29	0 49 52	0 52 19	0 54 49	0 57 26	1 0 5	1 2 50	1 5 39	1 8 31	1 11 27	1 14 27	1 17 32	1 20 43	1 23 58	1 27 16
20	0 48 20	0 50 46	0 53 16	0 55 49	0 58 29	1 1 15	1 4 3	1 6 55	1 9 51	1 12 51	1 15 55	1 19 4	1 22 19	1 25 38	1 29 0
21	0 49 14	0 51 44	0 54 18	0 56 55	0 59 39	1 2 28	1 5 20	1 8 16	1 11 16	1 14 20	1 17 29	1 20 42	1 24 1	1 27 24	1 30 50
22	0 50 12	0 52 46	0 55 24	0 58 6	1 0 53	1 3 45	1 6 41	1 9 41	1 12 46	1 15 55	1 19 9	1 22 26	1 25 49	1 29 17	1 32 47
23	0 51 15	0 53 52	0 56 34	0 59 21	1 2 12	1 5 7	1 8 7	1 11 12	1 14 22	1 17 37	1 20 56	1 24 18	1 27 45	1 31 18	1 34 54

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 36 23	0 38 6	0 39 52	0 41 41	0 43 34	0 45 29	0 47 28	0 49 30	0 51 35	0 53 43	0 55 54	0 58 9	1 0 26	1 2 47	1 5 11
1	0 35 59	0 37 41	0 39 26	0 41 13	0 43 5	0 44 58	0 46 55	0 48 53	0 50 57	0 53 3	0 55 12	0 57 25	0 59 40	1 1 59	1 4 22
2	0 35 35	0 37 16	0 39 0	0 40 46	0 42 36	0 44 27	0 46 22	0 48 17	0 50 20	0 52 24	0 54 31	0 56 42	0 58 55	1 1 12	1 3 34
3	0 35 12	0 36 51	0 38 34	0 40 19	0 42 7	0 43 56	0 45 50	0 47 42	0 49 44	0 51 46	0 53 51	0 56 0	0 58 11	1 0 26	1 2 46
4	0 34 49	0 36 26	0 38 8	0 39 52	0 41 38	0 43 26	0 45 18	0 47 8	0 49 9	0 51 9	0 53 12	0 55 19	0 57 28	0 59 41	1 1 59
5	0 34 26	0 36 1	0 37 42	0 39 25	0 41 9	0 42 56	0 44 46	0 46 35	0 48 34	0 50 32	0 52 33	0 54 39	0 56 46	0 58 57	1 1 13
6	0 34 3	0 35 37	0 37 16	0 38 58	0 40 41	0 42 26	0 44 14	0 46 2	0 47 59	0 49 56	0 51 55	0 54 0	0 56 5	0 58 14	1 0 28
7	0 33 40	0 35 13	0 36 50	0 38 31	0 40 13	0 41 56	0 43 43	0 45 30	0 47 25	0 49 21	0 51 19	0 53 22	0 55 25	0 57 32	0 59 44
8	0 33 17	0 34 49	0 36 24	0 38 4	0 39 45	0 41 27	0 43 12	0 44 59	0 46 52	0 48 47	0 50 44	0 52 44	0 54 47	0 56 52	0 59 2
9	0 32 54	0 34 25	0 35 59	0 37 37	0 39 17	0 40 58	0 42 42	0 44 29	0 46 20	0 48 13	0 50 9	0 52 8	0 54 9	0 56 13	0 58 21
10	0 32 31	0 34 1	0 35 34	0 37 10	0 38 49	0 40 29	0 42 12	0 43 59	0 45 48	0 47 40	0 49 34	0 51 32	0 53 32	0 55 35	0 57 41
11	0 32 9	0 33 38	0 35 10	0 36 44	0 38 22	0 40 1	0 41 43	0 43 29	0 45 16	0 47 7	0 49 0	0 50 57	0 52 55	0 54 57	0 57 1
12	0 31 47	0 33 15	0 34 45	0 36 18	0 37 55	0 39 33	0 41 14	0 42 59	0 44 44	0 46 34	0 48 26	0 50 21	0 52 18	0 54 19	0 56 21
13	0 31 25	0 32 52	0 34 20	0 35 52	0 37 28	0 39 5	0 40 45	0 42 28	0 44 12	0 46 1	0 47 52	0 49 45	0 51 41	0 53 41	0 55 41
14	0 31 2	0 32 28	0 33 55	0 35 26	0 37 1	0 38 37	0 40 16	0 41 57	0 43 40	0 45 28	0 47 18	0 49 9	0 51 4	0 53 3	0 55 1
15	0 30 39	0 32 4	0 33 30	0 35 0	0 36 34	0 38 9	0 39 47	0 41 26	0 43 8	0 44 55	0 46 44	0 48 33	0 50 27	0 52 24	0 54 21
16	0 30 16	0 31 40	0 33 5	0 34 34	0 36 7	0 37 41	0 39 17	0 40 55	0 42 36	0 44 22	0 46 9	0 47 57	0 49 50	0 51 45	0 53 41
17	0 29 53	0 31 16	0 32 40	0 34 8	0 35 40	0 37 13	0 38 47	0 40 24	0 42 4	0 43 49	0 45 34	0 47 21	0 49 13	0 51 6	0 53 1
18	0 29 30	0 30 52	0 32 15	0 33 42	0 35 12	0 36 44	0 38 17	0 39 53	0 41 32	0 43 15	0 44 59	0 46 45	0 48 36	0 50 27	0 52 21
19	0 29 7	0 30 28	0 31 50	0 33 16	0 34 44	0 36 15	0 37 47	0 39 22	0 41 0	0 42 41	0 44 24	0 46 9	0 47 59	0 49 48	0 51 41
20	0 28 44	0 30 4	0 31 25	0 32 50	0 34 16	0 35 46	0 37 17	0 38 51	0 40 28	0 42 7	0 43 49	0 45 33	0 47 21	0 49 9	0 51 0
21	0 28 20	0 29 39	0 30 59	0 32 23	0 33 48	0 35 17	0 36 47	0 38 19	0 39 55	0 41 33	0 43 14	0 44 56	0 46 43	0 48 29	0 50 19
22	0 27 55	0 29 13	0 30 32	0 31 55	0 33 19	0 34 46	0 36 16	0 37 47	0 39 21	0 40 58	0 42 38	0 44 18	0 46 3	0 47 48	0 49 36
23	0 27 29	0 28 45	0 30 4	0 31 25	0 32 48	0 34 14	0 35 43	0 37 14	0 38 47	0 40 23	0 42 1	0 43 40	0 45 22	0 47 6	0 48 52

LATITUDE 50° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 7 38	1 10 8	1 12 41	1 15 17	1 17 56	1 20 39	1 23 24	1 26 13	1 29 4	1 31 59	1 34 56	1 37 57	1 41 0	1 44 7	1 47 16
1	1 8 31	1 11 3	1 13 39	1 16 18	1 18 59	1 21 44	1 24 30	1 27 21	1 30 14	1 33 12	1 36 11	1 39 14	1 42 19	1 45 29	1 48 41
2	1 9 26	1 12 0	1 14 39	1 17 20	1 20 3	1 22 50	1 25 38	1 28 31	1 31 27	1 34 27	1 37 28	1 40 33	1 43 41	1 46 53	1 50 8
3	1 10 23	1 12 59	1 15 40	1 18 23	1 21 8	1 23 57	1 26 48	1 29 43	1 32 42	1 35 45	1 38 48	1 41 55	1 45 6	1 48 20	1 51 39
4	1 11 21	1 14 0	1 16 43	1 19 28	1 22 15	1 25 6	1 28 0	1 30 58	1 34 0	1 37 5	1 40 10	1 43 20	1 46 34	1 49 51	1 53 13
5	1 12 20	1 15 2	1 17 47	1 20 34	1 23 24	1 26 17	1 29 14	1 32 15	1 35 20	1 38 27	1 41 35	1 44 48	1 48 5	1 51 25	1 54 50
6	1 13 20	1 16 5	1 18 52	1 21 41	1 24 34	1 27 30	1 30 30	1 33 34	1 36 42	1 39 52	1 43 3	1 46 19	1 49 39	1 53 2	1 56 30
7	1 14 22	1 17 9	1 19 58	1 22 50	1 25 46	1 28 45	1 31 48	1 34 55	1 38 6	1 41 19	1 44 33	1 47 52	1 51 15	1 54 41	1 58 12
8	1 15 26	1 18 15	1 21 6	1 24 1	1 27 0	1 30 2	1 33 8	1 36 18	1 39 32	1 42 48	1 46 6	1 49 28	1 52 54	1 56 23	1 59 57
9	1 16 32	1 19 23	1 22 17	1 25 15	1 28 17	1 31 22	1 34 31	1 37 44	1 41 1	1 44 20	1 47 42	1 51 7	1 54 36	1 58 8	2 1 45
10	1 17 40	1 20 34	1 23 31	1 26 32	1 29 37	1 32 45	1 35 57	1 39 13	1 42 33	1 45 56	1 49 22	1 52 50	1 56 22	1 59 58	2 3 38
11	1 18 51	1 21 48	1 24 48	1 27 52	1 31 1	1 34 12	1 37 27	1 40 47	1 44 10	1 47 37	1 51 6	1 54 38	1 58 13	2 1 53	2 5 37
12	1 20 5	1 23 5	1 26 9	1 29 17	1 32 29	1 35 43	1 39 1	1 42 25	1 45 51	1 49 22	1 52 55	1 56 31	2 0 9	2 3 53	2 7 41
13	1 21 23	1 24 26	1 27 34	1 30 46	1 34 1	1 37 19	1 40 40	1 44 7	1 47 37	1 51 12	1 54 49	1 58 29	2 2 10	2 5 58	2 9 50
14	1 22 45	1 25 51	1 29 3	1 32 19	1 35 37	1 38 59	1 42 24	1 45 54	1 49 28	1 53 7	1 56 48	2 0 32	2 4 17	2 8 9	2 12 5
15	1 24 11	1 27 20	1 30 36	1 33 56	1 37 17	1 40 43	1 44 12	1 47 46	1 51 24	1 55 7	1 58 52	2 2 39	2 6 29	2 10 25	2 14 25
16	1 25 41	1 28 53	1 32 13	1 35 37	1 39 1	1 42 31	1 46 4	1 49 42	1 53 24	1 57 11	2 1 0	2 4 51	2 8 46	2 12 46	2 16 50
17	1 27 15	1 30 31	1 33 55	1 37 23	1 40 51	1 44 24	1 48 1	1 51 43	1 55 29	1 59 20	2 3 13	2 7 8	2 11 8	2 15 12	2 19 20
18	1 28 53	1 32 14	1 35 42	1 39 14	1 42 46	1 46 23	1 50 4	1 53 50	1 57 40	2 1 35	2 5 32	2 9 32	2 13 36	2 17 44	2 21 57
19	1 30 36	1 34 2	1 37 34	1 41 10	1 44 47	1 48 28	1 52 13	1 56 3	1 59 57	2 3 56	2 7 58	2 12 3	2 16 11	2 20 23	2 24 41
20	1 32 25	1 35 55	1 39 31	1 43 11	1 46 54	1 50 40	1 54 29	1 58 23	2 2 22	2 6 25	2 10 32	2 14 42	2 18 55	2 23 12	2 27 34
21	1 34 19	1 37 54	1 41 34	1 45 19	1 49 7	1 52 58	1 56 52	2 0 51	2 4 55	2 9 3	2 13 16	2 17 31	2 21 50	2 26 12	2 30 40
22	1 36 21	1 40 0	1 43 45	1 47 35	1 51 28	1 55 24	1 59 24	2 3 28	2 7 38	2 11 51	2 16 10	2 20 31	2 24 55	2 29 23	2 33 56
23	1 38 33	1 42 17	1 46 6	1 50 0	1 53 59	1 58 1	2 2 6	2 6 16	2 10 31	2 14 51	2 19 15	2 23 42	2 28 12	2 32 45	2 37 24

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 7 38	1 10 8	1 12 41	1 15 17	1 17 56	1 20 39	1 23 24	1 26 13	1 29 4	1 31 59	1 34 56	1 37 57	1 41 0	1 44 7	1 47 16
1	1 6 48	1 9 16	1 11 47	1 14 21	1 16 58	1 19 39	1 22 20	1 25 7	1 27 56	1 30 50	1 33 46	1 36 44	1 39 46	1 42 51	1 45 59
2	1 5 58	1 8 24	1 10 53	1 13 25	1 16 0	1 18 39	1 21 17	1 24 2	1 26 49	1 29 42	1 32 36	1 35 32	1 38 32	1 41 36	1 44 43
3	1 5 8	1 7 32	1 9 59	1 12 29	1 15 2	1 17 39	1 20 15	1 22 58	1 25 43	1 28 34	1 31 27	1 34 20	1 37 19	1 40 22	1 43 28
4	1 4 19	1 6 41	1 9 6	1 11 34	1 14 5	1 16 40	1 19 14	1 21 55	1 24 38	1 27 27	1 30 18	1 33 9	1 36 7	1 39 8	1 42 14
5	1 3 31	1 5 51	1 8 14	1 10 40	1 13 9	1 15 42	1 18 14	1 20 53	1 23 34	1 26 21	1 29 10	1 32 0	1 34 57	1 37 56	1 41 1
6	1 2 44	1 5 2	1 7 23	1 9 47	1 12 14	1 14 45	1 17 16	1 19 53	1 22 32	1 25 17	1 28 4	1 30 53	1 33 48	1 36 45	1 39 49
7	1 1 58	1 4 14	1 6 33	1 8 55	1 11 21	1 13 50	1 16 20	1 18 55	1 21 32	1 24 15	1 27 0	1 29 48	1 32 41	1 35 36	1 38 38
8	1 1 14	1 3 28	1 5 45	1 8 5	1 10 29	1 12 56	1 15 25	1 17 58	1 20 33	1 23 14	1 25 57	1 28 44	1 31 35	1 34 28	1 37 27
9	1 0 31	1 2 43	1 4 58	1 7 16	1 9 38	1 12 3	1 14 31	1 17 2	1 19 36	1 22 15	1 24 56	1 27 41	1 30 30	1 33 21	1 36 17
10	0 59 49	1 2 0	1 4 13	1 6 29	1 8 49	1 11 12	1 13 38	1 16 7	1 18 40	1 21 17	1 23 56	1 26 39	1 29 25	1 32 14	1 35 7
11	0 59 8	1 1 17	1 3 29	1 5 43	1 8 2	1 10 23	1 12 47	1 15 13	1 17 44	1 20 19	1 22 56	1 25 37	1 28 20	1 31 7	1 33 57
12	0 58 27	1 0 34	1 2 45	1 4 57	1 7 14	1 9 34	1 11 56	1 14 20	1 16 48	1 19 21	1 21 56	1 24 35	1 27 15	1 30 0	1 32 47
13	0 57 46	0 59 51	1 2 1	1 4 11	1 6 26	1 8 45	1 11 5	1 13 27	1 15 53	1 18 23	1 20 56	1 23 33	1 26 11	1 28 53	1 31 37
14	0 57 5	0 59 8	1 1 16	1 3 25	1 5 38	1 7 55	1 10 14	1 12 34	1 14 58	1 17 25	1 19 56	1 22 31	1 25 7	1 27 46	1 30 27
15	0 56 23	0 58 25	1 0 31	1 2 39	1 4 50	1 7 5	1 9 23	1 11 41	1 14 3	1 16 27	1 18 56	1 21 29	1 24 3	1 26 39	1 29 17
16	0 55 41	0 57 42	0 59 46	1 1 53	1 4 2	1 6 15	1 8 31	1 10 48	1 13 8	1 15 30	1 17 56	1 20 27	1 22 59	1 25 32	1 28 7
17	0 54 59	0 56 59	0 59 1	1 1 7	1 3 14	1 5 25	1 7 39	1 9 55	1 12 13	1 14 33	1 16 57	1 19 25	1 21 55	1 24 26	1 26 58
18	0 54 17	0 56 16	0 58 16	1 0 21	1 2 26	1 4 35	1 6 47	1 9 2	1 11 18	1 13 36	1 15 58	1 18 23	1 20 51	1 23 20	1 25 50
19	0 53 35	0 55 32	0 57 31	0 59 34	1 1 38	1 3 45	1 5 55	1 8 8	1 10 23	1 12 39	1 14 59	1 17 21	1 19 47	1 22 14	1 24 42
20	0 52 53	0 54 48	0 56 46	0 58 47	1 0 50	1 2 55	1 5 3	1 7 14	1 9 27	1 11 42	1 14 0	1 16 20	1 18 43	1 21 8	1 23 35
21	0 52 10	0 54 4	0 56 0	0 58 0	1 0 1	1 2 5	1 4 11	1 6 20	1 8 32	1 10 45	1 13 1	1 15 19	1 17 40	1 20 3	1 22 29
22	0 51 26	0 53 19	0 55 13	0 57 12	0 59 11	1 1 14	1 3 18	1 5 26	1 7 36	1 9 48	1 12 2	1 14 19	1 16 38	1 18 59	1 21 23
23	0 50 41	0 52 33	0 54 26	0 56 23	0 58 21	1 0 22	1 2 25	1 4 31	1 6 39	1 8 50	1 11 4	1 13 20	1 15 37	1 17 56	1 20 18

LATITUDE 51° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 7	0 10 12	0 10 19	0 10 30	0 10 45	0 11 2	0 11 23	0 11 47	0 12 14	0 12 44	0 13 17	0 13 54	0 14 33	0 15 17	0 16 2
1	0 10 9	0 10 15	0 10 22	0 10 33	0 10 48	0 11 5	0 11 27	0 11 50	0 12 18	0 12 48	0 13 22	0 13 59	0 14 39	0 15 24	0 16 10
2	0 10 11	0 10 17	0 10 25	0 10 36	0 10 51	0 11 8	0 11 31	0 11 53	0 12 22	0 12 52	0 13 27	0 14 4	0 14 45	0 15 31	0 16 18
3	0 10 13	0 10 19	0 10 28	0 10 39	0 10 54	0 11 11	0 11 35	0 11 56	0 12 26	0 12 56	0 13 32	0 14 10	0 14 51	0 15 38	0 16 26
4	0 10 15	0 10 21	0 10 30	0 10 42	0 10 57	0 11 14	0 11 38	0 12 0	0 12 30	0 13 1	0 13 37	0 14 16	0 14 57	0 15 45	0 16 34
5	0 10 17	0 10 23	0 10 32	0 10 45	0 11 0	0 11 17	0 11 41	0 12 4	0 12 34	0 13 6	0 13 42	0 14 22	0 15 4	0 15 52	0 16 42
6	0 10 19	0 10 25	0 10 34	0 10 47	0 11 3	0 11 20	0 11 44	0 12 8	0 12 38	0 13 11	0 13 47	0 14 28	0 15 11	0 15 59	0 16 50
7	0 10 21	0 10 27	0 10 36	0 10 49	0 11 6	0 11 23	0 11 47	0 12 12	0 12 42	0 13 16	0 13 52	0 14 34	0 15 18	0 16 6	0 16 58
8	0 10 23	0 10 29	0 10 38	0 10 51	0 11 8	0 11 26	0 11 50	0 12 16	0 12 46	0 13 21	0 13 58	0 14 40	0 15 25	0 16 13	0 17 6
9	0 10 25	0 10 31	0 10 40	0 10 53	0 11 10	0 11 29	0 11 53	0 12 20	0 12 51	0 13 26	0 14 4	0 14 46	0 15 32	0 16 21	0 17 14
10	0 10 27	0 10 33	0 10 42	0 10 55	0 11 12	0 11 32	0 11 56	0 12 24	0 12 56	0 13 31	0 14 10	0 14 52	0 15 39	0 16 29	0 17 22
11	0 10 29	0 10 35	0 10 44	0 10 57	0 11 14	0 11 35	0 11 59	0 12 28	0 13 0	0 13 36	0 14 16	0 14 59	0 15 47	0 16 37	0 17 31
12	0 10 31	0 10 37	0 10 46	0 10 59	0 11 16	0 11 38	0 12 2	0 12 32	0 13 5	0 13 41	0 14 22	0 15 6	0 15 55	0 16 45	0 17 40
13	0 10 33	0 10 39	0 10 48	0 11 1	0 11 18	0 11 41	0 12 5	0 12 36	0 13 10	0 13 46	0 14 28	0 15 13	0 16 3	0 16 54	0 17 50
14	0 10 35	0 10 41	0 10 50	0 11 3	0 11 20	0 11 44	0 12 8	0 12 40	0 13 15	0 13 51	0 14 34	0 15 20	0 16 11	0 17 3	0 18 0
15	0 10 37	0 10 43	0 10 52	0 11 5	0 11 23	0 11 47	0 12 12	0 12 44	0 13 20	0 13 57	0 14 40	0 15 27	0 16 19	0 17 12	0 18 10
16	0 10 39	0 10 45	0 10 54	0 11 7	0 11 26	0 11 50	0 12 16	0 12 48	0 13 25	0 14 3	0 14 46	0 15 34	0 16 27	0 17 22	0 18 21
17	0 10 41	0 10 47	0 10 56	0 11 9	0 11 29	0 11 53	0 12 20	0 12 52	0 13 30	0 14 9	0 14 53	0 15 42	0 16 35	0 17 32	0 18 32
18	0 10 42	0 10 49	0 10 58	0 11 12	0 11 32	0 11 56	0 12 24	0 12 56	0 13 35	0 14 15	0 15 0	0 15 51	0 16 44	0 17 42	0 18 44
19	0 10 43	0 10 50	0 11 0	0 11 15	0 11 35	0 11 59	0 12 28	0 13 1	0 13 40	0 14 21	0 15 7	0 15 59	0 16 53	0 17 52	0 18 56
20	0 10 44	0 10 51	0 11 2	0 11 18	0 11 38	0 12 3	0 12 32	0 13 6	0 13 45	0 14 27	0 15 14	0 16 6	0 17 2	0 18 3	0 19 8
21	0 10 45	0 10 52	0 11 4	0 11 20	0 11 40	0 12 7	0 12 36	0 13 11	0 13 50	0 14 34	0 15 22	0 16 15	0 17 12	0 18 14	0 19 20
22	0 10 46	0 10 53	0 11 6	0 11 22	0 11 43	0 12 10	0 12 40	0 13 16	0 13 56	0 14 41	0 15 30	0 16 24	0 17 23	0 18 26	0 19 34
23	0 10 48	0 10 55	0 11 7	0 11 24	0 11 46	0 12 13	0 12 44	0 13 20	0 14 2	0 14 48	0 15 38	0 16 34	0 17 35	0 18 40	0 19 50

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 7	0 10 12	0 10 19	0 10 30	0 10 45	0 11 2	0 11 23	0 11 47	0 12 14	0 12 44	0 13 17	0 13 54	0 14 33	0 15 17	0 16 2
1	0 10 4	0 10 9	0 10 16	0 10 27	0 10 41	0 10 58	0 11 19	0 11 43	0 12 9	0 12 39	0 13 12	0 13 48	0 14 27	0 15 10	0 15 54
2	0 10 1	0 10 6	0 10 13	0 10 24	0 10 37	0 10 54	0 11 15	0 11 39	0 12 4	0 12 34	0 13 7	0 13 42	0 14 21	0 15 3	0 15 46
3	0 9 58	0 10 3	0 10 10	0 10 20	0 10 33	0 10 50	0 11 11	0 11 34	0 11 59	0 12 29	0 13 1	0 13 36	0 14 14	0 14 56	0 15 38
4	0 9 55	0 10 0	0 10 7	0 10 16	0 10 29	0 10 46	0 11 7	0 11 29	0 11 54	0 12 24	0 12 55	0 13 30	0 14 7	0 14 49	0 15 30
5	0 9 51	0 9 56	0 10 3	0 10 12	0 10 25	0 10 42	0 11 3	0 11 24	0 11 49	0 12 19	0 12 49	0 13 24	0 14 0	0 14 42	0 15 22
6	0 9 47	0 9 52	0 9 59	0 10 8	0 10 21	0 10 38	0 10 58	0 11 19	0 11 44	0 12 13	0 12 43	0 13 18	0 13 53	0 14 34	0 15 14
7	0 9 43	0 9 48	0 9 55	0 10 4	0 10 17	0 10 34	0 10 53	0 11 14	0 11 39	0 12 7	0 12 37	0 13 11	0 13 46	0 14 26	0 15 6
8	0 9 39	0 9 44	0 9 51	0 10 0	0 10 13	0 10 30	0 10 48	0 11 9	0 11 34	0 12 1	0 12 31	0 13 4	0 13 39	0 14 18	0 14 58
9	0 9 35	0 9 40	0 9 47	0 9 56	0 10 9	0 10 25	0 10 43	0 11 4	0 11 29	0 11 55	0 12 25	0 12 57	0 13 32	0 14 10	0 14 50
10	0 9 31	0 9 36	0 9 43	0 9 52	0 10 5	0 10 20	0 10 38	0 10 59	0 11 23	0 11 49	0 12 19	0 12 50	0 13 25	0 14 2	0 14 42
11	0 9 27	0 9 32	0 9 39	0 9 47	0 10 0	0 10 15	0 10 33	0 10 54	0 11 17	0 11 43	0 12 13	0 12 43	0 13 18	0 13 54	0 14 34
12	0 9 22	0 9 27	0 9 34	0 9 42	0 9 55	0 10 10	0 10 28	0 10 49	0 11 11	0 11 37	0 12 6	0 12 36	0 13 10	0 13 46	0 14 25
13	0 9 17	0 9 22	0 9 29	0 9 37	0 9 49	0 10 4	0 10 22	0 10 43	0 11 4	0 11 30	0 11 59	0 12 28	0 13 2	0 13 38	0 14 16
14	0 9 11	0 9 16	0 9 23	0 9 31	0 9 43	0 9 58	0 10 16	0 10 36	0 10 57	0 11 23	0 11 51	0 12 20	0 12 53	0 13 29	0 14 7
15	0 9 5	0 9 10	0 9 17	0 9 25	0 9 36	0 9 51	0 10 9	0 10 29	0 10 50	0 11 15	0 11 43	0 12 12	0 12 44	0 13 20	0 13 57
16	0 8 58	0 9 3	0 9 10	0 9 18	0 9 29	0 9 44	0 10 2	0 10 21	0 10 42	0 11 7	0 11 34	0 12 3	0 12 35	0 13 11	0 13 47
17	0 8 51	0 8 56	0 9 3	0 9 11	0 9 22	0 9 36	0 9 54	0 10 13	0 10 34	0 10 58	0 11 25	0 11 54	0 12 25	0 13 1	0 13 37
18	0 8 43	0 8 48	0 8 55	0 9 3	0 9 14	0 9 28	0 9 45	0 10 4	0 10 25	0 10 48	0 11 15	0 11 44	0 12 15	0 12 50	0 13 26
19	0 8 35	0 8 39	0 8 46	0 8 54	0 9 5	0 9 19	0 9 35	0 9 54	0 10 15	0 10 38	0 11 4	0 11 33	0 12 4	0 12 38	0 13 14
20	0 8 26	0 8 29	0 8 36	0 8 44	0 8 55	0 9 9	0 9 25	0 9 43	0 10 4	0 10 27	0 10 53	0 11 21	0 11 52	0 12 25	0 13 1
21	0 8 15	0 8 18	0 8 25	0 8 33	0 8 44	0 8 58	0 9 13	0 9 31	0 9 52	0 10 15	0 10 41	0 11 8	0 11 39	0 12 11	0 12 47
22	0 8 2	0 8 6	0 8 13	0 8 21	0 8 32	0 8 45	0 9 0	0 9 18	0 9 39	0 10 2	0 10 27	0 10 54	0 11 24	0 11 56	0 12 32
23	0 7 50	0 7 53	0 7 59	0 8 7	0 8 19	0 8 31	0 8 46	0 9 4	0 9 24	0 9 47	0 10 12	0 10 39	0 11 8	0 11 40	0 12 15

LATITUDE 51° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 16 51	0 17 44	0 18 39	0 19 38	0 20 40	0 21 45	0 22 52	0 24 4	0 25 18	0 26 36	0 27 56	0 29 20	0 30 47	0 32 17	0 33 50
1	0 16 59	0 17 53	0 18 49	0 19 49	0 20 52	0 21 58	0 23 7	0 24 20	0 25 35	0 26 54	0 28 15	0 29 40	0 31 8	0 32 39	0 34 13
2	0 17 8	0 18 2	0 18 59	0 20 0	0 21 4	0 22 11	0 23 22	0 24 36	0 25 52	0 27 12	0 28 34	0 30 0	0 31 29	0 33 1	0 34 36
3	0 17 17	0 18 11	0 19 9	0 20 11	0 21 16	0 22 24	0 23 37	0 24 52	0 26 9	0 27 30	0 28 53	0 30 21	0 31 51	0 33 24	0 35 0
4	0 17 26	0 18 20	0 19 20	0 20 22	0 21 28	0 22 38	0 23 52	0 25 8	0 26 26	0 27 49	0 29 13	0 30 42	0 32 13	0 33 47	0 35 24
5	0 17 35	0 18 30	0 19 31	0 20 34	0 21 41	0 22 52	0 24 7	0 25 24	0 26 43	0 28 8	0 29 33	0 31 3	0 32 36	0 34 11	0 35 49
6	0 17 44	0 18 40	0 19 42	0 20 46	0 21 54	0 23 6	0 24 22	0 25 40	0 27 0	0 28 27	0 29 53	0 31 24	0 32 59	0 34 35	0 36 15
7	0 17 53	0 18 50	0 19 53	0 20 58	0 22 7	0 23 20	0 24 37	0 25 56	0 27 18	0 28 46	0 30 14	0 31 46	0 33 22	0 35 0	0 36 42
8	0 18 2	0 19 0	0 20 4	0 21 10	0 22 20	0 23 34	0 24 52	0 26 12	0 27 36	0 29 5	0 30 35	0 32 8	0 33 46	0 35 26	0 37 10
9	0 18 11	0 19 10	0 20 15	0 21 22	0 22 33	0 23 48	0 25 7	0 26 28	0 27 54	0 29 24	0 30 56	0 32 31	0 34 10	0 35 52	0 37 38
10	0 18 20	0 19 21	0 20 26	0 21 34	0 22 46	0 24 2	0 25 22	0 26 45	0 28 12	0 29 43	0 31 17	0 32 54	0 34 35	0 36 19	0 38 7
11	0 18 30	0 19 32	0 20 38	0 21 47	0 23 0	0 24 17	0 25 38	0 27 2	0 28 31	0 30 4	0 31 39	0 33 18	0 35 1	0 36 47	0 38 37
12	0 18 40	0 19 43	0 20 50	0 22 0	0 23 14	0 24 32	0 25 54	0 27 20	0 28 51	0 30 25	0 32 2	0 33 43	0 35 28	0 37 16	0 39 8
13	0 18 51	0 19 55	0 21 3	0 22 14	0 23 29	0 24 48	0 26 11	0 27 39	0 29 12	0 30 48	0 32 26	0 34 9	0 35 56	0 37 46	0 39 41
14	0 19 2	0 20 7	0 21 16	0 22 29	0 23 45	0 25 5	0 26 29	0 27 59	0 29 34	0 31 12	0 32 52	0 34 37	0 36 26	0 38 18	0 40 15
15	0 19 13	0 20 20	0 21 30	0 22 44	0 24 2	0 25 23	0 26 49	0 28 20	0 29 57	0 31 37	0 33 19	0 35 6	0 36 57	0 38 51	0 40 50
16	0 19 25	0 20 33	0 21 44	0 23 0	0 24 19	0 25 42	0 27 10	0 28 42	0 30 21	0 32 2	0 33 47	0 35 36	0 37 29	0 39 25	0 41 26
17	0 19 37	0 20 47	0 21 59	0 23 16	0 24 37	0 26 2	0 27 32	0 29 6	0 30 46	0 32 28	0 34 16	0 36 7	0 38 2	0 40 0	0 42 4
18	0 19 50	0 21 1	0 22 15	0 23 33	0 24 56	0 26 23	0 27 55	0 29 31	0 31 12	0 32 56	0 34 46	0 36 39	0 38 37	0 40 37	0 42 44
19	0 20 3	0 21 15	0 22 31	0 23 51	0 25 16	0 26 45	0 28 19	0 29 57	0 31 40	0 33 26	0 35 18	0 37 13	0 39 14	0 41 17	0 43 26
20	0 20 16	0 21 30	0 22 48	0 24 10	0 25 37	0 27 8	0 28 44	0 30 24	0 32 9	0 33 58	0 35 52	0 37 50	0 39 53	0 42 0	0 44 11
21	0 20 30	0 21 46	0 23 6	0 24 30	0 25 59	0 27 32	0 29 10	0 30 53	0 32 41	0 34 32	0 36 29	0 38 29	0 40 35	0 42 45	0 44 58
22	0 20 46	0 22 4	0 23 26	0 24 52	0 26 23	0 27 58	0 29 39	0 31 25	0 33 15	0 35 9	0 37 8	0 39 12	0 41 21	0 43 33	0 45 48
23	0 21 5	0 22 25	0 23 49	0 25 17	0 26 50	0 28 28	0 30 11	0 31 59	0 33 52	0 35 49	0 37 51	0 39 58	0 42 10	0 44 25	0 46 42

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 16 51	0 17 44	0 18 39	0 19 38	0 20 40	0 21 45	0 22 52	0 24 4	0 25 18	0 26 36	0 27 56	0 29 20	0 30 47	0 32 17	0 33 50
1	0 16 43	0 17 35	0 18 30	0 19 28	0 20 29	0 21 33	0 22 39	0 23 51	0 25 4	0 26 21	0 27 40	0 29 3	0 30 29	0 31 56	0 33 28
2	0 16 35	0 17 26	0 18 20	0 19 18	0 20 18	0 21 21	0 22 26	0 23 37	0 24 50	0 26 5	0 27 24	0 28 46	0 30 10	0 31 36	0 33 7
3	0 16 27	0 17 17	0 18 10	0 19 8	0 20 7	0 21 9	0 22 13	0 23 23	0 24 35	0 25 50	0 27 8	0 28 28	0 29 51	0 31 16	0 32 46
4	0 16 19	0 17 8	0 18 0	0 18 57	0 19 56	0 20 57	0 22 0	0 23 9	0 24 20	0 25 34	0 26 51	0 28 10	0 29 32	0 30 56	0 32 25
5	0 16 11	0 16 59	0 17 50	0 18 46	0 19 45	0 20 45	0 21 47	0 22 55	0 24 5	0 25 18	0 26 34	0 27 52	0 29 13	0 30 36	0 32 4
6	0 16 2	0 16 50	0 17 40	0 18 35	0 19 34	0 20 33	0 21 34	0 22 41	0 23 50	0 25 2	0 26 17	0 27 34	0 28 54	0 30 16	0 31 43
7	0 15 53	0 16 41	0 17 30	0 18 24	0 19 22	0 20 21	0 21 21	0 22 27	0 23 35	0 24 46	0 26 0	0 27 16	0 28 35	0 29 56	0 31 22
8	0 15 44	0 16 31	0 17 20	0 18 13	0 19 10	0 20 9	0 21 8	0 22 13	0 23 20	0 24 30	0 25 43	0 26 58	0 28 16	0 29 36	0 31 1
9	0 15 35	0 16 21	0 17 10	0 18 2	0 18 58	0 19 56	0 20 55	0 21 59	0 23 5	0 24 14	0 25 26	0 26 40	0 27 57	0 29 16	0 30 40
10	0 15 26	0 16 11	0 17 0	0 17 51	0 18 46	0 19 43	0 20 42	0 21 45	0 22 50	0 23 58	0 25 9	0 26 22	0 27 38	0 28 57	0 30 19
11	0 15 17	0 16 1	0 16 50	0 17 40	0 18 34	0 19 30	0 20 29	0 21 31	0 22 35	0 23 42	0 24 52	0 26 4	0 27 19	0 28 38	0 29 59
12	0 15 8	0 15 51	0 16 40	0 17 29	0 18 22	0 19 17	0 20 16	0 21 17	0 22 20	0 23 26	0 24 35	0 25 46	0 27 0	0 28 19	0 29 39
13	0 14 59	0 15 41	0 16 30	0 17 18	0 18 10	0 19 4	0 20 3	0 21 3	0 22 5	0 23 10	0 24 18	0 25 28	0 26 41	0 27 59	0 29 19
14	0 14 49	0 15 31	0 16 19	0 17 7	0 17 58	0 18 51	0 19 49	0 20 49	0 21 50	0 22 54	0 24 1	0 25 10	0 26 22	0 27 39	0 28 58
15	0 14 39	0 15 20	0 16 8	0 16 55	0 17 46	0 18 38	0 19 35	0 20 34	0 21 34	0 22 38	0 23 44	0 24 52	0 26 3	0 27 19	0 28 37
16	0 14 29	0 15 9	0 15 56	0 16 43	0 17 33	0 18 24	0 19 21	0 20 19	0 21 18	0 22 22	0 23 27	0 24 34	0 25 44	0 26 59	0 28 16
17	0 14 18	0 14 58	0 15 44	0 16 30	0 17 20	0 18 10	0 19 6	0 20 4	0 21 2	0 22 5	0 23 10	0 24 16	0 25 25	0 26 39	0 27 55
18	0 14 6	0 14 46	0 15 31	0 16 16	0 17 6	0 17 56	0 18 51	0 19 48	0 20 46	0 21 48	0 22 52	0 23 57	0 25 6	0 26 19	0 27 33
19	0 13 53	0 14 33	0 15 17	0 16 2	0 16 51	0 17 41	0 18 35	0 19 31	0 20 29	0 21 30	0 22 33	0 23 38	0 24 47	0 25 58	0 27 11
20	0 13 39	0 14 19	0 15 2	0 15 47	0 16 35	0 17 25	0 18 18	0 19 13	0 20 11	0 21 11	0 22 13	0 23 18	0 24 26	0 25 36	0 26 48
21	0 13 24	0 14 4	0 14 47	0 15 31	0 16 18	0 17 8	0 18 0	0 18 55	0 19 52	0 20 51	0 21 52	0 22 57	0 24 4	0 25 13	0 26 24
22	0 13 8	0 13 48	0 14 30	0 15 14	0 16 0	0 16 50	0 17 41	0 18 35	0 19 31	0 20 30	0 21 30	0 22 34	0 23 40	0 25 48	0 25 59
23	0 12 51	0 13 30	0 14 12	0 14 55	0 15 41	0 16 30	0 17 21	0 18 14	0 19 9	0 20 7	0 21 7	0 22 10	0 23 15	0 24 22	0 25 32

LATITUDE 51° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 35 26	0 37 5	0 38 48	0 40 33	0 42 22	0 44 13	0 46 8	0 48 5	0 50 7	0 52 10	0 54 17	0 56 27	0 58 39	1 0 55	1 3 14
1	0 35 50	0 37 30	0 39 14	0 41 0	0 42 50	0 44 43	0 46 39	0 48 37	0 50 40	0 52 45	0 54 54	0 57 9	0 59 24	1 1 42	1 4 3
2	0 36 14	0 37 56	0 39 41	0 41 28	0 43 19	0 45 14	0 47 11	0 49 11	0 51 15	0 53 22	0 55 33	0 57 53	1 0 10	1 2 30	1 4 53
3	0 36 39	0 38 23	0 40 9	0 41 57	0 43 50	0 45 47	0 47 45	0 49 46	0 51 52	0 54 1	0 56 14	0 58 38	1 0 57	1 3 19	1 5 44
4	0 37 5	0 38 51	0 40 38	0 42 27	0 44 22	0 46 21	0 48 21	0 50 23	0 52 31	0 54 42	0 56 57	0 59 24	1 1 45	1 4 9	1 6 36
5	0 37 32	0 39 20	0 41 8	0 42 58	0 44 55	0 46 56	0 48 58	0 51 2	0 53 12	0 55 25	0 57 42	1 0 11	1 2 34	1 5 0	1 7 29
6	0 38 0	0 39 49	0 41 39	0 43 31	0 45 30	0 47 33	0 49 37	0 51 42	0 53 54	0 56 9	0 58 28	1 0 59	1 3 24	1 5 52	1 8 23
7	0 38 28	0 40 19	0 42 11	0 44 5	0 46 6	0 48 11	0 50 17	0 52 23	0 54 37	0 56 55	0 59 16	1 1 48	1 4 15	1 6 45	1 9 18
8	0 38 57	0 40 49	0 42 44	0 44 40	0 46 43	0 48 50	0 50 58	0 53 6	0 55 22	0 57 43	1 0 6	1 2 38	1 5 7	1 7 39	1 10 14
9	0 39 27	0 41 21	0 43 18	0 45 16	0 47 21	0 49 30	0 51 40	0 53 51	0 56 9	0 58 33	1 0 58	1 3 29	1 6 0	1 8 34	1 11 11
10	0 39 58	0 41 54	0 43 53	0 45 54	0 48 1	0 50 12	0 52 24	0 54 38	0 56 58	0 59 24	1 1 52	1 4 22	1 6 55	1 9 31	1 12 11
11	0 40 31	0 42 29	0 44 30	0 46 33	0 48 42	0 50 55	0 53 9	0 55 26	0 57 48	1 0 16	1 2 46	1 5 16	1 7 52	1 10 31	1 13 14
12	0 41 5	0 43 5	0 45 8	0 47 14	0 49 25	0 51 40	0 53 56	0 56 15	0 58 39	1 1 9	1 3 42	1 6 13	1 8 52	1 11 34	1 14 20
13	0 41 40	0 43 43	0 45 48	0 47 56	0 50 9	0 52 26	0 54 44	0 57 6	0 59 33	1 2 5	1 4 41	1 7 13	1 9 55	1 12 40	1 15 29
14	0 42 16	0 44 22	0 46 29	0 48 40	0 50 55	0 53 14	0 55 35	0 57 59	1 0 29	1 3 3	1 5 42	1 8 16	1 11 1	1 13 49	1 16 41
15	0 42 53	0 45 2	0 47 11	0 49 25	0 51 42	0 54 3	0 56 27	0 58 54	1 1 27	1 4 3	1 6 45	1 9 23	1 12 11	1 15 2	1 17 57
16	0 43 31	0 45 43	0 47 55	0 50 12	0 52 31	0 54 54	0 57 21	0 59 51	1 2 27	1 5 6	1 7 51	1 10 34	1 13 25	1 16 19	1 19 17
17	0 44 11	0 46 25	0 48 40	0 51 0	0 53 22	0 55 47	0 58 17	1 0 50	1 3 29	1 6 12	1 9 0	1 11 48	1 14 42	1 17 39	1 20 41
18	0 44 53	0 47 9	0 49 27	0 51 50	0 54 15	0 56 43	0 59 16	1 1 53	1 4 35	1 7 21	1 10 12	1 13 5	1 16 2	1 19 2	1 22 8
19	0 45 38	0 47 56	0 50 17	0 52 43	0 55 11	0 57 42	1 0 18	1 2 59	1 5 44	1 8 33	1 11 27	1 14 25	1 17 25	1 20 28	1 23 38
20	0 46 26	0 48 46	0 51 10	0 53 39	0 56 11	0 58 45	1 1 24	1 4 9	1 6 57	1 9 49	1 12 46	1 15 48	1 18 52	1 21 59	1 25 13
21	0 47 16	0 49 39	0 52 6	0 54 38	0 57 13	0 59 51	1 2 34	1 5 22	1 8 14	1 11 10	1 14 11	1 17 16	1 20 24	1 23 35	1 26 52
22	0 48 9	0 50 35	0 53 5	0 55 41	0 58 19	1 1 1	1 3 48	1 6 40	1 9 35	1 12 35	1 15 40	1 18 49	1 22 1	1 25 17	1 28 37
23	0 49 6	0 51 35	0 54 9	0 56 48	0 59 30	1 2 16	1 5 7	1 8 3	1 11 2	1 14 6	1 17 15	1 20 28	1 23 45	1 27 6	1 30 31

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 35 26	0 37 5	0 38 48	0 40 33	0 42 22	0 44 13	0 46 8	0 48 5	0 50 7	0 52 10	0 54 17	0 56 27	0 58 39	1 0 55	1 3 14
1	0 35 3	0 36 41	0 38 23	0 40 7	0 41 54	0 43 43	0 45 36	0 47 31	0 49 31	0 51 32	0 53 37	0 55 45	0 57 55	1 0 9	1 2 26
2	0 34 40	0 36 17	0 37 58	0 39 41	0 41 26	0 43 13	0 45 4	0 46 58	0 48 56	0 50 55	0 52 58	0 55 4	0 57 12	0 59 24	1 1 39
3	0 34 18	0 35 53	0 37 33	0 39 15	0 40 58	0 42'44	0 44 33	0 46 26	0 48 22	0 50 19	0 52 20	0 54 24	0 56 30	0 58 40	1 0 53
4	0 33 56	0 35 29	0 37 8	0 38 49	0 40 31	0 42 15	0 44 2	0 45 54	0 47 48	0 49 44	0 51 43	0 53 45	0 55 49	0 57 57	1 0 8
5	0 33 34	0 35 6	0 36 43	0 38 23	0 40 4	0 41 46	0 43 32	0 45 22	0 47 15	0 49 9	0 51 7	0 53 7	0 55 9	0 57 15	0 59 25
6	0 33 12	0 34 43	0 36 18	0 37 57	0 39 37	0 41 18	0 43 3	0 44 51	0 46 42	0 48 35	0 50 31	0 52 30	0 54 31	0 56 35	0 58 43
7	0 32 50	0 34 20	0 35 53	0 37 31	0 39 10	0 40 50	0 42 34	0 44 20	0 46 10	0 48 1	0 49 56	0 51 54	0 53 54	0 55 56	0 58 2
8	0 32 28	0 33 57	0 35 29	0 37 5	0 38 43	0 40 22	0 42 5	0 43 50	0 45 38	0 47 28	0 49 22	0 51 19	0 53 18	0 55 19	0 57 23
9	0 32 6	0 33 34	0 35 5	0 36 39	0 38 16	0 39 55	0 41 37	0 43 21	0 45 7	0 46 56	0 48 49	0 50 44	0 52 42	0 54 42	0 56 45
10	0 31 44	0 33 11	0 34 41	0 36 14	0 37 49	0 39 28	0 41 9	0 42 52	0 44 37	0 46 25	0 48 16	0 50 10	0 52 7	0 54 6	0 56 8
11	0 31 23	0 32 49	0 34 18	0 35 50	0 37 23	0 39 1	0 40 41	0 42 23	0 44 7	0 45 54	0 47 44	0 49 37	0 51 32	0 53 30	0 55 30
12	0 31 2	0 32 27	0 33 55	0 35 25	0 36 57	0 38 34	0 40 13	0 41 54	0 43 37	0 45 23	0 47 12	0 49 4	0 50 57	0 52 54	0 54 52
13	0 30 40	0 32 4	0 33 31	0 35 0	0 36 31	0 38 7	0 39 45	0 41 25	0 43 7	0 44 52	0 46 40	0 48 31	0 50 22	0 52 18	0 54 14
14	0 30 18	0 31 41	0 33 7	0 34 35	0 36 5	0 37 40	0 39 17	0 40 56	0 42 37	0 44 21	0 46 8	0 47 58	0 49 47	0 51 42	0 53 36
15	0 29 56	0 31 18	0 32 43	0 34 10	0 35 39	0 37 13	0 38 48	0 40 26	0 42 6	0 43 49	0 45 35	0 47 24	0 49 11	0 51 5	0 52 58
16	0 29 34	0 30 55	0 32 19	0 33 45	0 35 13	0 36 45	0 38 19	0 39 56	0 41 35	0 43 17	0 45 2	0 46 50	0 48 35	0 50 28	0 52 20
17	0 29 12	0 30 32	0 31 55	0 33 20	0 34 47	0 36 17	0 37 50	0 39 26	0 41 4	0 42 44	0 44 28	0 46 15	0 47 59	0 49 50	0 51 41
18	0 28 49	0 30 8	0 31 30	0 32 54	0 34 20	0 35 49	0 37 21	0 38 56	0 40 32	0 42 11	0 43 53	0 45 39	0 47 22	0 49 12	0 51 2
19	0 28 26	0 29 44	0 31 5	0 32 28	0 33 53	0 35 21	0 36 51	0 38 25	0 40 0	0 41 37	0 43 18	0 45 2	0 46 45	0 48 33	0 50 22
20	0 28 2	0 29 19	0 30 39	0 32 1	0 33 25	0 34 52	0 36 21	0 37 53	0 39 27	0 41 3	0 42 42	0 44 24	0 46 7	0 47 54	0 49 42
21	0 27 37	0 28 53	0 30 12	0 31 33	0 32 50	0 34 22	0 35 50	0 37 21	0 38 54	0 40 29	0 42 7	0 43 17	0 45 29	0 47 15	0 49 2
22	0 27 11	0 28 26	0 29 44	0 31 4	0 32 26	0 33 51	0 35 18	0 36 48	0 38 20	0 39 54	0 41 30	0 43 9	0 44 50	0 46 34	0 48 20
23	0 26 44	0 27 58	0 29 15	0 30 34	0 31 55	0 33 19	0 34 45	0 36 13	0 37 44	0 39 17	0 40 52	0 42 30	0 44 10	0 45 52	0 47 37

LATITUDE 51° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 5 37	1 8 1	1 10 29	1 13 0	1 15 35	1 18 11	1 20 51	1 23 34	1 26 19	1 29 8	1 32 0	1 34 54	1 37 51	1 40 52	1 43 55
1	1 6 28	1 8 54	1 11 24	1 13 57	1 16 34	1 19 12	1 21 54	1 24 39	1 27 26	1 30 17	1 33 11	1 36 7	1 39 7	1 42 10	1 45 15
2	1 7 20	1 9 48	1 12 20	1 14 55	1 17 34	1 20 14	1 22 58	1 25 45	1 28 34	1 31 27	1 34 23	1 37 21	1 40 24	1 43 29	1 46 36
3	1 8 13	1 10 43	1 13 17	1 15 54	1 18 35	1 21 17	1 24 3	1 26 52	1 29 43	1 32 38	1 35 36	1 38 37	1 41 43	1 44 50	1 47 59
4	1 9 7	1 11 39	1 14 15	1 16 54	1 19 37	1 22 21	1 25 10	1 28 1	1 30 54	1 33 51	1 36 51	1 39 55	1 43 4	1 46 14	1 49 25
5	1 10 2	1 12 36	1 15 14	1 17 55	1 20 40	1 23 26	1 26 18	1 29 11	1 32 7	1 35 6	1 38 9	1 41 16	1 44 28	1 47 41	1 50 54
6	1 10 58	1 13 35	1 16 15	1 18 58	1 21 45	1 24 33	1 27 28	1 30 24	1 33 22	1 36 24	1 39 29	1 42 39	1 45 54	1 49 10	1 52 26
7	1 11 55	1 14 35	1 17 18	1 20 3	1 22 52	1 25 43	1 28 41	1 31 40	1 34 40	1 37 44	1 40 52	1 44 5	1 47 23	1 50 42	1 54 1
8	1 12 53	1 15 36	1 18 22	1 21 10	1 24 1	1 26 55	1 29 56	1 32 58	1 36 1	1 39 7	1 42 18	1 45 34	1 48 55	1 52 17	1 55 39
9	1 13 53	1 16 39	1 19 28	1 22 19	1 25 13	1 28 10	1 31 14	1 34 19	1 37 25	1 40 34	1 43 48	1 47 7	1 50 31	1 53 56	1 57 21
10	1 14 56	1 17 44	1 20 36	1 23 30	1 26 27	1 29 28	1 32 35	1 35 43	1 38 53	1 42 6	1 45 23	1 48 45	1 52 12	1 55 40	1 59 8
11	1 16 2	1 18 53	1 21 48	1 24 45	1 27 45	1 30 49	1 33 59	1 37 10	1 40 24	1 43 41	1 47 1	1 50 26	1 53 56	1 57 28	2 1 1
12	1 17 11	1 20 5	1 23 3	1 26 3	1 29 6	1 32 13	1 35 26	1 38 40	1 41 58	1 45 19	1 48 42	1 52 10	1 55 43	1 59 19	2 2 57
13	1 18 23	1 21 21	1 24 21	1 27 24	1 30 30	1 33 40	1 36 56	1 40 13	1 43 35	1 47 0	1 50 26	1 53 57	1 57 33	2 1 13	2 4 56
14	1 19 38	1 22 39	1 25 42	1 28 48	1 31 57	1 35 10	1 38 29	1 41 50	1 45 16	1 48 45	1 52 15	1 55 49	1 59 28	2 3 11	2 6 59
15	1 20 57	1 24 1	1 27 7	1 30 16	1 33 28	1 36 44	1 40 6	1 43 31	1 47 1	1 50 34	1 54 8	1 57 45	2 1 27	2 5 14	2 9 7
16	1 22 20	1 25 27	1 28 36	1 31 48	1 35 4	1 38 23	1 41 48	1 45 17	1 48 51	1 52 28	1 56 6	1 59 47	2 3 32	2 7 23	2 11 21
17	1 23 47	1 26 57	1 30 9	1 33 24	1 36 44	1 40 7	1 43 35	1 47 8	1 50 46	1 54 27	1 58 9	2 1 54	2 5 43	2 9 38	2 13 41
18	1 25 18	1 28 31	1 31 46	1 35 5	1 38 29	1 41 56	1 45 27	1 49 4	1 52 46	1 56 31	2 0 17	2 4 6	2 7 59	2 11 58	2 16 6
19	1 26 52	1 30 9	1 33 28	1 36 51	1 40 19	1 43 50	1 47 25	1 51 6	1 54 52	1 58 41	2 2 31	2 6 24	2 10 21	2 14 24	2 18 37
20	1 28 31	1 31 52	1 35 15	1 38 42	1 42 14	1 45 50	1 49 30	1 53 15	1 57 5	2 0 57	2 4 51	2 8 48	2 12 49	2 16 56	2 21 8
21	1 30 14	1 33 39	1 37 6	1 40 38	1 44 15	1 47 56	1 51 41	1 55 30	1 59 24	2 3 21	2 7 19	2 11 21	2 15 27	2 19 38	2 23 54
22	1 32 3	1 35 32	1 39 4	1 42 41	1 46 23	1 50 9	1 53 59	1 57 53	2 1 52	2 5 49	2 9 56	2 14 3	2 18 15	2 22 31	2 26 52
23	1 34 2	1 37 35	1 41 12	1 44 54	1 48 41	1 52 32	1 56 28	2 0 27	2 4 30	2 8 36	2 12 44	2 16 57	2 21 14	2 25 35	2 30 2

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 5 37	1 8 1	1 10 29	1 13 0	1 15 35	1 18 11	1 20 51	1 23 34	1 26 19	1 29 8	1 32 0	1 34 54	1 37 51	1 40 52	1 43 55
1	1 4 48	1 7 10	1 9 36	1 12 5	1 14 38	1 17 13	1 19 52	1 22 33	1 25 16	1 28 3	1 30 54	1 33 46	1 36 41	1 39 37	1 42 37
2	1 4 0	1 6 20	1 8 44	1 11 11	1 13 42	1 16 16	1 18 53	1 21 32	1 24 14	1 26 59	1 29 48	1 32 38	1 35 31	1 38 23	1 41 20
3	1 3 13	1 5 31	1 7 53	1 10 18	1 12 47	1 15 19	1 17 55	1 20 32	1 23 12	1 25 55	1 28 42	1 31 30	1 34 21	1 37 10	1 40 4
4	1 2 26	1 4 43	1 7 3	1 9 26	1 11 53	1 14 23	1 16 57	1 19 32	1 22 10	1 24 52	1 27 37	1 30 23	1 33 12	1 35 58	1 39 49
5	1 1 40	1 3 56	1 6 14	1 8 35	1 11 0	1 13 29	1 16 1	1 18 34	1 21 10	1 23 50	1 26 33	1 29 17	1 32 4	1 34 47	1 38 35
6	1 0 56	1 3 10	1 5 27	1 7 46	1 10 9	1 12 36	1 15 6	1 17 37	1 20 11	1 22 49	1 25 30	1 28 12	1 30 57	1 33 37	1 37 22
7	1 0 13	1 2 26	1 4 41	1 6 58	1 9 19	1 11 44	1 14 12	1 16 41	1 19 13	1 21 49	1 24 28	1 27 8	1 29 51	1 32 29	1 36 11
8	0 59 32	1 1 43	1 3 56	1 6 12	1 8 31	1 10 54	1 13 20	1 15 47	1 18 17	1 20 51	1 23 28	1 26 6	1 28 46	1 31 22	1 35 2
9	0 58 52	1 1 1	1 3 12	1 5 27	1 7 44	1 10 5	1 12 29	1 14 54	1 17 22	1 19 54	1 22 29	1 25 5	1 27 42	1 30 17	1 33 55
10	0 58 13	1 0 20	1 2 30	1 4 43	1 6 59	1 9 17	1 11 39	1 14 2	1 16 28	1 18 58	1 21 31	1 24 5	1 26 39	1 29 14	1 31 50
11	0 57 34	0 59 40	1 1 48	1 3 59	1 6 13	1 8 29	1 10 50	1 13 10	1 15 36	1 18 3	1 20 33	1 23 6	1 25 38	1 28 12	1 30 47
12	0 56 55	0 59 0	1 1 6	1 3 15	1 5 27	1 7 41	1 10 1	1 12 18	1 14 43	1 17 8	1 19 36	1 22 7	1 24 37	1 27 10	1 29 45
13	0 56 16	0 58 19	1 0 23	1 2 30	1 4 41	1 6 53	1 9 12	1 11 26	1 13 50	1 16 13	1 18 39	1 21 8	1 23 37	1 26 8	1 28 43
14	0 55 37	0 57 38	0 59 40	1 1 45	1 3 55	1 6 5	1 8 22	1 10 35	1 12 57	1 15 18	1 17 42	1 20 9	1 22 37	1 25 7	1 27 41
15	0 54 57	0 56 57	0 58 57	1 1 0	1 3 9	1 5 17	1 7 32	1 9 44	1 12 4	1 14 23	1 16 45	1 19 10	1 21 37	1 24 6	1 26 39
16	0 54 17	0 56 15	0 58 14	1 0 15	1 2 23	1 4 29	1 6 42	1 8 53	1 11 11	1 13 28	1 15 48	1 18 11	1 20 37	1 23 5	1 25 37
17	0 53 36	0 55 33	0 57 30	0 59 30	1 1 36	1 3 41	1 5 52	1 8 2	1 10 18	1 12 33	1 14 51	1 17 12	1 19 37	1 22 4	1 24 35
18	0 52 55	0 54 50	0 56 46	0 58 45	1 0 49	1 2 53	1 5 2	1 7 11	1 9 25	1 11 38	1 13 54	1 16 13	1 18 37	1 21 3	1 23 33
19	0 52 13	0 54 7	0 56 2	0 58 0	1 0 2	1 2 5	1 4 12	1 6 20	1 8 32	1 10 43	1 12 57	1 15 14	1 17 37	1 20 2	1 22 30
20	0 51 31	0 53 24	0 55 18	0 57 15	0 59 15	1 1 17	1 3 22	1 5 29	1 7 39	1 9 49	1 12 50	1 14 16	1 16 37	1 19 1	1 21 27
21	0 50 50	0 52 42	0 54 35	0 56 31	0 58 29	1 0 30	1 2 33	1 4 38	1 6 46	1 8 55	1 11 4	1 13 18	1 15 37	1 17 59	1 20 23
22	0 50 8	0 51 58	0 53 50	0 55 45	0 57 42	0 59 41	1 1 43	1 3 46	1 5 52	1 8 0	1 10 8	1 12 21	1 14 37	1 16 57	1 19 18
23	0 49 24	0 51 13	0 53 4	0 54 58	0 56 54	0 58 51	1 0 51	1 2 53	1 4 57	1 7 4	1 9 13	1 11 24	1 13 38	1 15 54	1 18 12

LATITUDE 52° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 11	0 10 15	0 10 23	0 10 33	0 10 47	0 11 4	0 11 24	0 11 47	0 12 13	0 12 42	0 13 14	0 13 49	0 14 28	0 15 9	0 15 52
1	0 10 13	0 10 18	0 10 26	0 10 36	0 10 50	0 11 7	0 11 28	0 11 51	0 12 18	0 12 46	0 13 20	0 13 54	0 14 34	0 15 15	0 15 59
2	0 10 15	0 10 21	0 10 29	0 10 39	0 10 53	0 11 10	0 11 32	0 11 55	0 12 22	0 12 50	0 13 25	0 13 59	0 14 40	0 15 22	0 16 6
3	0 10 17	0 10 23	0 10 32	0 10 42	0 10 56	0 11 13	0 11 36	0 11 59	0 12 26	0 12 54	0 13 30	0 14 4	0 14 46	0 15 29	0 16 13
4	0 10 19	0 10 25	0 10 34	0 10 45	0 10 59	0 11 16	0 11 39	0 12 3	0 12 30	0 12 58	0 13 35	0 14 10	0 14 52	0 15 36	0 16 21
5	0 10 21	0 10 27	0 10 36	0 10 48	0 11 2	0 11 19	0 11 42	0 12 7	0 12 34	0 13 2	0 13 40	0 14 16	0 14 58	0 15 43	0 16 29
6	0 10 23	0 10 29	0 10 38	0 10 50	0 11 5	0 11 22	0 11 45	0 12 11	0 12 38	0 13 7	0 13 45	0 14 22	0 15 4	0 15 50	0 16 37
7	0 10 25	0 10 31	0 10 40	0 10 52	0 11 8	0 11 25	0 11 48	0 12 14	0 12 42	0 13 12	0 13 50	0 14 28	0 15 10	0 15 57	0 16 45
8	0 10 27	0 10 33	0 10 42	0 10 54	0 11 10	0 11 28	0 11 51	0 12 17	0 12 46	0 13 17	0 13 55	0 14 34	0 15 16	0 16 4	0 16 53
9	0 10 29	0 10 35	0 10 44	0 10 56	0 11 12	0 11 31	0 11 54	0 12 20	0 12 50	0 13 22	0 14 0	0 14 40	0 15 23	0 16 11	0 17 1
10	0 10 31	0 10 37	0 10 46	0 10 58	0 11 14	0 11 34	0 11 57	0 12 23	0 12 54	0 13 27	0 14 5	0 14 46	0 15 30	0 16 18	0 17 9
11	0 10 33	0 10 39	0 10 48	0 11 0	0 11 16	0 11 36	0 12 0	0 12 26	0 12 58	0 13 32	0 14 10	0 14 52	0 15 37	0 16 26	0 17 18
12	0 10 35	0 10 41	0 10 50	0 11 2	0 11 18	0 11 38	0 12 3	0 12 29	0 13 2	0 13 37	0 14 15	0 14 58	0 15 44	0 16 34	0 17 27
13	0 10 37	0 10 43	0 10 52	0 11 4	0 11 20	0 11 40	0 12 6	0 12 33	0 13 6	0 13 42	0 14 21	0 15 4	0 15 51	0 16 42	0 17 36
14	0 10 39	0 10 45	0 10 54	0 11 6	0 11 22	0 11 43	0 12 9	0 12 37	0 13 10	0 13 47	0 14 27	0 15 10	0 15 58	0 16 50	0 17 45
15	0 10 41	0 10 47	0 10 56	0 11 8	0 11 24	0 11 46	0 12 12	0 12 41	0 13 14	0 13 52	0 14 33	0 15 17	0 16 6	0 16 58	0 17 55
16	0 10 42	0 10 48	0 10 58	0 11 10	0 11 26	0 11 49	0 12 15	0 12 45	0 13 18	0 13 57	0 14 39	0 15 24	0 16 14	0 17 7	0 18 5
17	0 10 43	0 10 49	0 11 0	0 11 12	0 11 28	0 11 52	0 12 18	0 12 49	0 13 22	0 14 2	0 14 45	0 15 31	0 16 22	0 17 16	0 18 15
18	0 10 44	0 10 50	0 11 1	0 11 14	0 11 31	0 11 55	0 12 21	0 12 53	0 13 27	0 14 7	0 14 51	0 15 38	0 16 30	0 17 25	0 18 25
19	0 10 45	0 10 51	0 11 2	0 11 16	0 11 34	0 11 58	0 12 24	0 12 57	0 13 32	0 14 12	0 14 57	0 15 45	0 16 38	0 17 34	0 18 35
20	0 10 46	0 10 52	0 11 3	0 11 18	0 11 37	0 12 1	0 12 28	0 13 1	0 13 37	0 14 18	0 15 3	0 15 52	0 16 46	0 17 43	0 18 45
21	0 10 47	0 10 53	0 11 4	0 11 20	0 11 39	0 12 4	0 12 32	0 13 5	0 13 42	0 14 24	0 15 10	0 16 0	0 16 55	0 17 53	0 18 56
22	0 10 48	0 10 55	0 11 6	0 11 22	0 11 42	0 12 7	0 12 36	0 13 9	0 13 47	0 14 30	0 15 17	0 16 9	0 17 5	0 18 4	0 19 9
23	0 10 50	0 10 57	0 11 8	0 11 24	0 11 45	0 12 10	0 12 40	0 13 14	0 13 53	0 14 37	0 15 25	0 16 18	0 17 15	0 18 17	0 19 24

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 11	0 10 15	0 10 23	0 10 33	0 10 47	0 11 4	0 11 24	0 11 47	0 12 13	0 12 42	0 13 14	0 13 49	0 14 28	0 15 9	0 15 52
1	0 10 8	0 10 12	0 10 20	0 10 30	0 10 43	0 11 0	0 11 20	0 11 43	0 12 8	0 12 37	0 13 9	0 13 43	0 14 22	0 15 2	0 15 45
2	0 10 5	0 10 9	0 10 17	0 10 27	0 10 39	0 10 56	0 11 16	0 11 39	0 12 3	0 12 32	0 13 4	0 13 37	0 14 16	0 14 55	0 15 38
3	0 10 2	0 10 6	0 10 14	0 10 23	0 10 35	0 10 52	0 11 12	0 11 35	0 11 58	0 12 27	0 12 59	0 13 31	0 14 10	0 14 48	0 15 31
4	0 9 59	0 10 3	0 10 10	0 10 19	0 10 31	0 10 48	0 11 8	0 11 30	0 11 53	0 12 22	0 12 53	0 13 25	0 14 3	0 14 41	0 15 24
5	0 9 55	0 9 59	0 10 6	0 10 15	0 10 27	0 10 44	0 11 4	0 11 25	0 11 48	0 12 17	0 12 47	0 13 19	0 13 56	0 14 34	0 15 17
6	0 9 51	0 9 55	0 10 2	0 10 11	0 10 23	0 10 40	0 11 0	0 11 20	0 11 43	0 12 12	0 12 41	0 13 13	0 13 49	0 14 27	0 15 9
7	0 9 47	0 9 51	0 9 58	0 10 7	0 10 19	0 10 36	0 10 55	0 11 15	0 11 38	0 12 6	0 12 35	0 13 7	0 13 42	0 14 20	0 15 1
8	0 9 43	0 9 47	0 9 54	0 10 3	0 10 15	0 10 32	0 10 50	0 11 10	0 11 33	0 12 0	0 12 29	0 13 1	0 13 35	0 14 13	0 14 53
9	0 9 39	0 9 43	0 9 50	0 9 59	0 10 11	0 10 27	0 10 45	0 11 5	0 11 28	0 11 54	0 12 23	0 12 55	0 13 28	0 14 6	0 14 45
10	0 9 35	0 9 39	0 9 46	0 9 55	0 10 7	0 10 22	0 10 40	0 11 0	0 11 23	0 11 48	0 12 17	0 12 48	0 13 21	0 13 58	0 14 37
11	0 9 31	0 9 35	0 9 42	0 9 51	0 10 2	0 10 17	0 10 35	0 10 55	0 11 17	0 11 42	0 12 11	0 12 41	0 13 14	0 13 50	0 14 29
12	0 9 27	0 9 30	0 9 37	0 9 46	0 9 57	0 10 12	0 10 30	0 10 49	0 11 11	0 11 36	0 12 5	0 12 34	0 13 6	0 13 42	0 14 20
13	0 9 22	0 9 25	0 9 31	0 9 40	0 9 51	0 10 6	0 10 24	0 10 43	0 11 4	0 11 29	0 11 58	0 12 26	0 12 58	0 13 34	0 14 11
14	0 9 16	0 9 19	0 9 25	0 9 34	0 9 45	0 9 59	0 10 17	0 10 36	0 10 57	0 11 22	0 11 50	0 12 18	0 12 49	0 13 25	0 14 1
15	0 9 9	0 9 12	0 9 18	0 9 27	0 9 38	0 9 52	0 10 10	0 10 29	0 10 49	0 11 14	0 11 42	0 12 9	0 12 40	0 13 16	0 13 51
16	0 9 2	0 9 5	0 9 11	0 9 20	0 9 30	0 9 44	0 10 2	0 10 21	0 10 41	0 11 5	0 11 33	0 12 0	0 12 30	0 13 6	0 13 41
17	0 8 54	0 8 57	0 9 3	0 9 12	0 9 22	0 9 35	0 9 53	0 10 12	0 10 32	0 10 55	0 11 23	0 11 50	0 12 20	0 12 55	0 13 30
18	0 8 45	0 8 48	0 8 54	0 9 3	0 9 13	0 9 26	0 9 43	0 10 2	0 10 22	0 10 45	0 11 12	0 11 39	0 12 9	0 12 43	0 13 18
19	0 8 35	0 8 38	0 8 44	0 8 53	0 9 3	0 9 16	0 9 32	0 9 51	0 10 11	0 10 34	0 11 0	0 11 27	0 11 57	0 12 30	0 13 5
20	0 8 24	0 8 27	0 8 33	0 8 42	0 8 52	0 9 5	0 9 21	0 9 39	0 9 59	0 10 22	0 10 47	0 11 14	0 11 44	0 12 16	0 12 51
21	0 8 12	0 8 15	0 8 21	0 8 30	0 8 40	0 8 53	0 9 9	0 9 26	0 9 46	0 10 9	0 10 34	0 11 0	0 11 30	0 12 2	0 12 36
22	0 7 59	0 8 2	0 8 8	0 8 17	0 8 27	0 8 40	0 8 55	0 9 12	0 9 32	0 9 55	0 10 19	0 10 45	0 11 15	0 11 46	0 12 20
23	0 7 45	0 7 48	0 7 54	0 8 2	0 8 12	0 8 25	0 8 40	0 8 57	0 9 17	0 9 39	0 10 3	0 10 29	0 10 58	0 11 29	0 12 2

LATITUDE 52° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 16 40	0 17 31	0 18 25	0 19 22	0 20 21	0 21 24	0 22 30	0 23 39	0 24 50	0 26 5	0 27 23	0 28 44	0 30 7	0 31 34	0 33 4
1	0 16 48	0 17 40	0 18 35	0 19 32	0 20 32	0 21 36	0 22 43	0 23 53	0 25 5	0 26 21	0 27 40	0 29 2	0 30 26	0 31 54	0 33 26
2	0 16 56	0 17 49	0 18 45	0 19 43	0 20 43	0 21 48	0 22 56	0 24 7	0 25 20	0 26 37	0 27 57	0 29 20	0 30 45	0 32 14	0 33 45
3	0 17 4	0 17 58	0 18 55	0 19 54	0 20 54	0 22 0	0 23 9	0 24 21	0 25 35	0 26 53	0 28 14	0 29 39	0 31 5	0 32 35	0 34 6
4	0 17 12	0 18 7	0 19 5	0 20 5	0 21 6	0 22 13	0 23 23	0 24 36	0 25 51	0 27 10	0 28 32	0 29 58	0 31 25	0 32 57	0 34 28
5	0 17 20	0 18 16	0 19 15	0 20 16	0 21 18	0 22 26	0 23 37	0 24 51	0 26 7	0 27 27	0 28 50	0 30 17	0 31 45	0 33 19	0 34 51
6	0 17 29	0 18 25	0 19 25	0 20 27	0 21 30	0 22 39	0 23 51	0 25 6	0 26 23	0 27 44	0 29 8	0 30 37	0 32 6	0 33 42	0 35 15
7	0 17 38	0 18 34	0 19 35	0 20 38	0 21 42	0 22 52	0 24 5	0 25 21	0 26 40	0 28 2	0 29 27	0 30 57	0 32 28	0 34 5	0 35 40
8	0 17 47	0 18 43	0 19 45	0 20 49	0 21 54	0 23 5	0 24 20	0 25 27	0 26 57	0 28 21	0 29 47	0 31 18	0 32 51	0 34 29	0 36 6
9	0 17 56	0 18 53	0 19 55	0 21 0	0 22 7	0 23 19	0 24 35	0 25 43	0 27 15	0 28 40	0 30 8	0 31 40	0 33 15	0 34 54	0 36 34
10	0 18 5	0 19 3	0 20 5	0 21 11	0 22 20	0 23 33	0 24 50	0 26 9	0 27 33	0 29 0	0 30 30	0 32 3	0 33 40	0 35 20	0 37 2
11	0 18 15	0 19 14	0 20 16	0 21 23	0 22 34	0 23 48	0 25 6	0 26 26	0 27 52	0 29 20	0 30 52	0 32 26	0 34 5	0 35 46	0 37 30
12	0 18 25	0 19 25	0 20 28	0 21 36	0 22 48	0 24 4	0 25 23	0 26 44	0 28 11	0 29 41	0 31 14	0 32 50	0 34 30	0 36 13	0 37 59
13	0 18 35	0 19 36	0 20 40	0 21 49	0 23 3	0 24 20	0 25 40	0 27 3	0 28 31	0 30 2	0 31 37	0 33 15	0 34 56	0 36 41	0 38 29
14	0 18 46	0 19 48	0 20 52	0 22 3	0 23 18	0 24 37	0 25 58	0 27 23	0 28 52	0 30 24	0 32 1	0 33 41	0 35 24	0 37 11	0 39 1
15	0 18 57	0 20 0	0 21 5	0 22 17	0 23 34	0 24 54	0 26 17	0 27 43	0 29 14	0 30 47	0 32 26	0 34 8	0 35 53	0 37 42	0 39 34
16	0 19 8	0 20 12	0 21 18	0 22 31	0 23 50	0 25 12	0 26 36	0 28 4	0 29 36	0 31 11	0 32 52	0 34 36	0 36 23	0 38 14	0 40 8
17	0 19 19	0 20 24	0 21 32	0 22 46	0 24 7	0 25 30	0 26 56	0 28 25	0 29 59	0 31 36	0 33 19	0 35 5	0 36 54	0 38 47	0 40 43
18	0 19 30	0 20 37	0 21 46	0 23 2	0 24 24	0 25 49	0 27 16	0 28 47	0 30 23	0 32 2	0 33 47	0 35 35	0 37 26	0 39 21	0 41 19
19	0 19 41	0 20 50	0 22 1	0 23 19	0 24 42	0 26 8	0 27 37	0 29 10	0 30 48	0 32 29	0 34 16	0 36 6	0 37 59	0 39 56	0 41 56
20	0 19 52	0 21 3	0 22 17	0 23 37	0 25 0	0 26 28	0 27 59	0 29 34	0 31 14	0 32 57	0 34 46	0 36 38	0 38 33	0 40 33	0 42 36
21	0 20 4	0 21 17	0 22 33	0 23 55	0 25 18	0 26 48	0 28 21	0 29 58	0 31 40	0 33 25	0 35 17	0 37 11	0 39 10	0 41 13	0 43 19
22	0 20 18	0 21 33	0 22 50	0 24 15	0 25 38	0 27 10	0 28 45	0 30 25	0 32 9	0 33 57	0 35 50	0 37 48	0 39 50	0 41 56	0 44 5
23	0 20 35	0 21 50	0 23 9	0 24 38	0 26 1	0 27 34	0 29 12	0 30 54	0 32 41	0 34 32	0 36 27	0 38 28	0 40 34	0 42 43	0 44 55

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 16 40	0 17 31	0 18 25	0 19 22	0 20 21	0 21 24	0 22 30	0 23 39	0 24 50	0 26 5	0 27 23	0 28 44	0 30 7	0 31 34	0 33 4
1	0 16 32	0 17 23	0 18 16	0 19 12	0 20 11	0 21 13	0 22 18	0 23 26	0 24 36	0 25 51	0 27 8	0 28 28	0 29 50	0 31 16	0 32 45
2	0 16 24	0 17 15	0 18 7	0 19 2	0 20 1	0 21 2	0 22 6	0 23 13	0 24 22	0 25 36	0 26 52	0 28 12	0 29 33	0 30 58	0 32 26
3	0 16 16	0 17 6	0 17 58	0 18 52	0 19 50	0 20 51	0 21 54	0 23 0	0 24 8	0 25 21	0 26 36	0 27 55	0 29 16	0 30 39	0 32 6
4	0 16 8	0 16 57	0 17 49	0 18 42	0 19 39	0 20 40	0 21 42	0 22 47	0 23 54	0 25 6	0 26 20	0 27 38	0 28 58	0 30 20	0 31 46
5	0 16 0	0 16 48	0 17 40	0 18 32	0 19 28	0 20 28	0 21 30	0 22 34	0 23 40	0 24 51	0 26 4	0 27 21	0 28 40	0 30 1	0 31 26
6	0 15 52	0 16 39	0 17 30	0 18 22	0 19 17	0 20 16	0 21 18	0 22 21	0 23 26	0 24 36	0 25 48	0 27 4	0 28 22	0 29 42	0 31 6
7	0 15 44	0 16 30	0 17 20	0 18 12	0 19 6	0 20 4	0 21 5	0 22 8	0 23 12	0 24 21	0 25 32	0 26 47	0 28 4	0 29 23	0 30 46
8	0 15 36	0 16 21	0 17 10	0 18 2	0 18 55	0 19 52	0 20 52	0 21 55	0 22 58	0 24 6	0 25 16	0 26 30	0 27 46	0 29 4	0 30 26
9	0 15 28	0 16 12	0 17 0	0 17 51	0 18 44	0 19 40	0 20 39	0 21 41	0 22 44	0 23 51	0 25 0	0 26 13	0 27 28	0 28 45	0 30 6
10	0 15 19	0 16 3	0 16 50	0 17 40	0 18 33	0 19 28	0 20 26	0 21 27	0 22 30	0 23 36	0 24 44	0 25 56	0 27 10	0 28 26	0 29 45
11	0 15 10	0 15 54	0 16 40	0 17 29	0 18 22	0 19 16	0 20 13	0 21 13	0 22 16	0 23 21	0 24 28	0 25 39	0 26 52	0 28 7	0 29 26
12	0 15 1	0 15 45	0 16 30	0 17 18	0 18 11	0 19 4	0 20 0	0 20 59	0 22 2	0 23 6	0 24 12	0 25 22	0 26 34	0 27 48	0 29 6
13	0 14 51	0 15 35	0 16 19	0 17 7	0 17 59	0 18 52	0 19 47	0 20 45	0 21 47	0 22 51	0 23 56	0 25 5	0 26 16	0 27 29	0 28 46
14	0 14 41	0 15 25	0 16 8	0 16 55	0 17 47	0 18 39	0 19 34	0 20 31	0 21 32	0 22 35	0 23 39	0 24 47	0 25 58	0 27 10	0 28 26
15	0 14 30	0 15 14	0 15 56	0 16 43	0 17 35	0 18 26	0 19 20	0 20 16	0 21 16	0 22 19	0 23 22	0 24 29	0 25 39	0 26 51	0 28 6
16	0 14 19	0 15 2	0 15 44	0 16 30	0 17 22	0 18 12	0 19 6	0 20 1	0 21 0	0 22 2	0 23 4	0 24 11	0 25 20	0 26 31	0 27 46
17	0 14 7	0 14 49	0 15 31	0 16 17	0 17 8	0 17 57	0 18 51	0 19 45	0 20 44	0 21 45	0 22 46	0 23 52	0 25 0	0 26 11	0 27 25
18	0 13 55	0 14 36	0 15 18	0 16 3	0 16 53	0 17 42	0 18 35	0 19 29	0 20 27	0 21 27	0 22 28	0 23 33	0 24 40	0 25 50	0 27 3
19	0 13 42	0 14 22	0 15 4	0 15 49	0 16 37	0 17 26	0 18 18	0 19 12	0 20 9	0 21 8	0 22 9	0 23 13	0 24 19	0 25 28	0 26 40
20	0 13 28	0 14 7	0 14 49	0 15 33	0 16 20	0 17 9	0 18 0	0 18 54	0 19 50	0 20 48	0 21 49	0 22 52	0 23 57	0 25 5	0 26 16
21	0 13 13	0 13 51	0 14 33	0 15 16	0 16 3	0 16 51	0 17 41	0 18 35	0 19 30	0 20 27	0 21 28	0 22 30	0 23 34	0 24 41	0 25 51
22	0 12 56	0 13 34	0 14 15	0 14 58	0 15 44	0 16 32	0 17 21	0 18 14	0 19 9	0 20 5	0 21 5	0 22 6	0 23 10	0 24 16	0 25 25
23	0 12 38	0 13 16	0 13 56	0 14 39	0 15 24	0 16 11	0 17 0	0 17 52	0 18 46	0 19 42	0 20 41	0 21 41	0 22 45	0 23 50	0 24 58

LATITUDE 52° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 34 37	0 36 13	0 37 51	0 39 33	0 41 18	0 43 6	0 44 56	0 46 50	0 48 47	0 50 46	0 52 48	0 54 54	0 57 2	0 59 13	1 1 27
1	0 34 59	0 36 34	0 38 14	0 39 58	0 41 44	0 43 34	0 45 26	0 47 22	0 49 20	0 51 20	0 53 24	0 55 31	0 57 41	0 59 54	1 2 8
2	0 35 21	0 36 57	0 38 38	0 40 24	0 42 11	0 44 3	0 45 57	0 47 55	0 49 54	0 51 55	0 54 1	0 56 9	0 58 21	1 0 36	1 2 51
3	0 35 44	0 37 21	0 39 3	0 40 51	0 42 39	0 44 33	0 46 29	0 48 29	0 50 29	0 52 32	0 54 39	0 56 49	0 59 3	1 1 20	1 3 36
4	0 36 7	0 37 46	0 39 29	0 41 19	0 43 8	0 45 4	0 47 2	0 49 4	0 51 6	0 53 10	0 55 19	0 57 31	0 59 47	1 2 6	1 4 23
5	0 36 31	0 38 12	0 39 57	0 41 48	0 43 39	0 45 36	0 47 36	0 49 40	0 51 44	0 53 50	0 56 1	0 58 15	1 0 33	1 2 54	1 5 12
6	0 36 56	0 38 40	0 40 26	0 42 18	0 44 11	0 46 9	0 48 11	0 50 17	0 52 23	0 54 31	0 56 44	0 59 0	1 1 20	1 3 43	1 6 3
7	0 37 22	0 39 9	0 40 56	0 42 49	0 44 44	0 46 43	0 48 47	0 50 55	0 53 3	0 55 13	0 57 28	0 59 46	1 2 8	1 4 33	1 6 56
8	0 37 49	0 39 38	0 41 27	0 43 22	0 45 19	0 47 19	0 49 24	0 51 34	0 53 44	0 55 56	0 58 13	1 0 33	1 2 57	1 5 24	1 7 51
9	0 38 18	0 40 8	0 42 0	0 43 57	0 45 56	0 47 57	0 50 3	0 52 14	0 54 26	0 56 41	0 59 0	1 1 22	1 3 48	1 6 17	1 8 48
10	0 38 49	0 40 40	0 42 35	0 44 34	0 46 35	0 48 37	0 50 45	0 52 57	0 55 11	0 57 28	0 59 49	1 2 13	1 4 41	1 7 12	1 9 47
11	0 39 20	0 41 13	0 43 11	0 45 12	0 47 14	0 49 18	0 51 28	0 53 42	0 55 58	0 58 18	1 0 41	1 3 7	1 5 35	1 8 10	1 10 49
12	0 39 51	0 41 46	0 43 47	0 45 50	0 47 54	0 50 0	0 52 12	0 54 28	0 56 46	0 59 9	1 1 34	1 4 2	1 6 32	1 9 9	1 11 53
13	0 40 23	0 42 20	0 44 24	0 46 29	0 48 35	0 50 43	0 52 57	0 55 15	0 57 35	1 0 1	1 2 28	1 4 58	1 7 32	1 10 11	1 12 59
14	0 40 57	0 42 55	0 45 2	0 47 9	0 49 17	0 51 27	0 53 43	0 56 3	0 58 26	1 0 55	1 3 25	1 5 57	1 8 34	1 11 16	1 14 7
15	0 41 32	0 43 32	0 45 41	0 47 50	0 50 0	0 52 12	0 54 31	0 56 53	0 59 19	1 1 51	1 4 24	1 6 58	1 9 38	1 12 23	1 15 17
16	0 42 8	0 44 10	0 46 21	0 48 32	0 50 44	0 52 59	0 55 21	0 57 45	1 0 14	1 2 49	1 5 25	1 8 1	1 10 44	1 13 32	1 16 29
17	0 42 45	0 44 49	0 47 2	0 49 15	0 51 30	0 53 48	0 56 13	0 58 39	1 1 11	1 3 49	1 6 28	1 9 7	1 11 53	1 14 43	1 17 43
18	0 43 23	0 45 29	0 47 44	0 50 0	0 52 18	0 54 39	0 57 6	0 59 35	1 2 10	1 4 51	1 7 33	1 10 15	1 13 4	1 15 57	1 18 59
19	0 44 24	0 46 11	0 48 28	0 50 47	0 53 8	0 55 32	0 58 1	1 0 33	1 3 11	1 6 55	1 8 40	1 11 25	1 14 18	1 17 14	1 20 18
20	0 44 44	0 46 57	0 49 15	0 51 36	0 54 0	0 56 27	0 58 59	1 1 35	1 4 16	1 7 3	1 9 51	1 12 40	1 15 35	1 18 35	1 21 39
21	0 45 29	0 47 44	0 50 4	0 52 28	0 54 55	0 57 26	1 0 1	1 2 41	1 5 25	1 8 15	1 11 6	1 13 59	1 16 58	1 20 2	1 23 5
22	0 46 18	0 48 35	0 50 58	0 53 25	0 55 55	0 58 30	1 1 9	1 3 53	1 6 40	1 9 32	1 12 26	1 15 23	1 18 25	1 21 34	1 24 42
23	0 47 11	0 49 31	0 51 57	0 54 28	0 57 2	0 59 39	1 2 22	1 5 10	1 8 1	1 10 56	1 13 54	1 16 56	1 20 3	1 23 15	1 26 31

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 34 37	0 36 13	0 37 51	0 39 33	0 41 18	0 43 6	0 44 56	0 46 50	0 48 47	0 50 46	0 52 48	0 54 54	0 57 2	0 59 13	1 1 27
1	0 34 19	0 35 51	0 37 27	0 39 8	0 40 52	0 42 39	0 44 25	0 46 17	0 48 12	0 50 10	0 52 11	0 54 15	0 56 21	0 58 30	1 0 42
2	0 34 56	0 35 29	0 37 4	0 38 43	0 40 26	0 42 12	0 43 55	0 45 45	0 47 38	0 49 35	0 51 35	0 53 37	0 55 41	0 57 48	0 59 58
3	0 33 35	0 35 7	0 36 41	0 38 18	0 40 0	0 41 45	0 43 26	0 45 14	0 47 5	0 49 1	0 50 59	0 53 0	0 55 2	0 57 7	0 59 15
4	0 33 14	0 34 45	0 36 18	0 37 54	0 39 34	0 41 18	0 42 57	0 44 44	0 46 33	0 48 27	0 50 24	0 52 24	0 54 24	0 56 27	0 58 33
5	0 32 53	0 34 23	0 35 55	0 37 30	0 39 8	0 40 51	0 42 29	0 44 15	0 46 2	0 47 54	0 49 49	0 51 48	0 53 47	0 55 48	0 57 52
6	0 32 32	0 34 1	0 35 32	0 37 6	0 38 42	0 40 24	0 42 1	0 43 46	0 45 32	0 47 22	0 49 15	0 51 13	0 53 10	0 55 10	0 57 12
7	0 32 11	0 33 39	0 35 9	0 36 42	0 38 17	0 39 57	0 41 34	0 43 17	0 45 2	0 46 51	0 48 42	0 50 38	0 52 34	0 54 33	0 56 34
8	0 31 50	0 33 17	0 34 46	0 36 18	0 37 52	0 39 30	0 41 7	0 42 49	0 44 33	0 46 20	0 48 10	0 50 4	0 51 59	0 53 57	0 55 57
9	0 31 19	0 32 55	0 34 23	0 35 54	0 37 27	0 39 3	0 40 40	0 42 21	0 44 4	0 45 50	0 47 39	0 49 31	0 51 25	0 53 22	0 55 21
10	0 31 8	0 32 33	0 34 0	0 35 30	0 37 2	0 38 36	0 40 13	0 41 53	0 43 35	0 45 20	0 47 8	0 48 59	0 50 52	0 52 47	0 54 45
11	0 30 47	0 32 11	0 33 37	0 35 6	0 36 37	0 38 10	0 39 46	0 41 25	0 43 6	0 44 50	0 46 37	0 48 27	0 50 19	0 52 13	0 54 10
12	0 30 26	0 31 49	0 33 14	0 34 42	0 36 12	0 37 44	0 39 19	0 40 57	0 42 37	0 44 20	0 46 6	0 47 55	0 49 46	0 51 39	0 53 35
13	0 30 5	0 31 27	0 32 51	0 34 18	0 35 47	0 37 18	0 38 52	0 40 29	0 42 8	0 43 50	0 45 35	0 47 23	0 49 13	0 51 5	0 52 59
14	0 29 44	0 31 5	0 32 28	0 33 54	0 35 22	0 36 52	0 38 25	0 40 1	0 41 39	0 43 20	0 45 3	0 46 50	0 48 39	0 50 30	0 52 23
15	0 29 23	0 30 43	0 32 5	0 33 30	0 34 57	0 36 26	0 37 58	0 39 32	0 41 9	0 42 49	0 44 31	0 46 17	0 48 5	0 49 54	0 51 46
16	0 29 2	0 30 21	0 31 42	0 33 6	0 34 31	0 35 59	0 37 30	0 39 3	0 40 39	0 42 18	0 43 59	0 45 44	0 47 30	0 49 18	0 51 9
17	0 28 40	0 29 58	0 31 18	0 32 41	0 34 5	0 35 32	0 37 2	0 38 34	0 40 9	0 41 47	0 43 26	0 45 10	0 46 55	0 48 41	0 50 31
18	0 28 17	0 29 34	0 30 54	0 32 15	0 33 38	0 35 4	0 36 33	0 38 4	0 39 38	0 41 15	0 42 53	0 44 35	0 46 19	0 48 4	0 49 52
19	0 27 53	0 29 9	0 30 28	0 31 48	0 33 10	0 34 36	0 36 4	0 37 34	0 39 6	0 40 42	0 42 19	0 43 59	0 45 42	0 47 26	0 49 13
20	0 27 28	0 28 43	0 30 1	0 31 20	0 32 41	0 34 7	0 35 34	0 37 3	0 38 34	0 40 8	0 41 44	0 43 23	0 45 4	0 46 47	0 48 33
21	0 27 3	0 28 17	0 29 34	0 30 52	0 32 12	0 33 37	0 35 3	0 36 31	0 38 1	0 39 33	0 41 8	0 42 46	0 44 26	0 46 8	0 47 52
22	0 26 36	0 27 49	0 29 5	0 30 22	0 31 42	0 33 5	0 34 30	0 35 57	0 37 26	0 38 57	0 40 31	0 42 8	0 43 46	0 45 27	0 47 10
23	0 26 8	0 27 20	0 28 35	0 29 51	0 31 11	0 32 32	0 33 56	0 35 22	0 36 50	0 38 20	0 39 53	0 41 28	0 43 5	0 44 45	0 46 26

LATITUDE 52° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 3 44	1 6 4	1 8 27	1 10 53	1 13 22	1 15 54	1 18 28	1 21 5	1 23 45	1 26 28	1 29 14	1 32 2	1 34 53	1 37 48	1 40 45
1	1 4 26	1 6 48	1 9 14	1 11 42	1 14 11	1 16 45	1 19 21	1 21 59	1 24 42	1 27 29	1 30 17	1 33 6	1 36 0	1 38 58	1 41 58
2	1 5 11	1 7 35	1 10 3	1 12 33	1 15 2	1 17 38	1 20 17	1 22 56	1 25 42	1 28 32	1 31 22	1 34 13	1 37 9	1 40 10	1 43 13
3	1 5 58	1 8 24	1 10 54	1 13 26	1 15 56	1 18 34	1 21 15	1 23 56	1 26 44	1 29 37	1 32 29	1 35 22	1 38 21	1 41 24	1 44 30
4	1 6 47	1 9 15	1 11 47	1 14 21	1 16 53	1 19 33	1 22 16	1 24 59	1 27 49	1 30 44	1 33 39	1 36 34	1 39 36	1 42 41	1 45 50
5	1 7 38	1 10 8	1 12 42	1 15 18	1 17 52	1 20 35	1 23 20	1 26 5	1 28 57	1 31 54	1 34 52	1 37 50	1 40 54	1 44 1	1 47 13
6	1 8 31	1 11 3	1 13 39	1 16 17	1 18 54	1 21 39	1 24 26	1 27 14	1 30 8	1 33 7	1 36 58	1 39 8	1 42 15	1 45 24	1 48 39
7	1 9 26	1 12 0	1 14 38	1 17 18	1 19 59	1 22 46	1 25 35	1 28 26	1 31 22	1 34 23	1 37 26	1 40 30	1 43 39	1 46 50	1 50 8
8	1 10 23	1 13 0	1 15 40	1 18 22	1 21 16	1 23 56	1 26 47	1 29 41	1 32 39	1 35 42	1 38 47	1 41 55	1 45 6	1 48 20	1 51 40
9	1 11 22	1 14 2	1 16 44	1 19 29	1 22 27	1 25 9	1 28 2	1 30 59	1 34 0	1 37 5	1 40 12	1 43 23	1 46 36	1 49 53	1 53 15
10	1 12 25	1 15 6	1 17 50	1 20 38	1 23 31	1 26 25	1 29 20	1 32 20	1 35 25	1 38 32	1 41 41	1 44 54	1 48 11	1 51 31	1 54 55
11	1 13 29	1 16 13	1 19 0	1 21 51	1 24 47	1 27 44	1 30 42	1 33 46	1 36 54	1 40 4	1 43 16	1 46 31	1 49 51	1 53 14	1 56 41
12	1 14 36	1 17 23	1 20 13	1 23 7	1 26 5	1 29 7	1 32 8	1 35 15	1 38 26	1 41 39	1 44 55	1 48 11	1 51 34	1 55 0	1 58 30
13	1 15 45	1 18 35	1 21 28	1 24 25	1 27 26	1 30 32	1 33 36	1 36 46	1 40 1	1 43 17	1 46 36	1 49 54	1 53 20	1 56 49	2 0 22
14	1 16 57	1 19 50	1 22 46	1 25 46	1 28 50	1 31 59	1 35 6	1 38 19	1 41 38	1 44 57	1 48 19	1 51 40	1 55 9	1 58 41	2 2 18
15	1 18 11	1 21 7	1 24 6	1 27 9	1 30 16	1 33 28	1 36 38	1 39 54	1 43 17	1 46 39	1 50 4	1 53 29	1 57 1	2 0 36	2 4 17
16	1 19 27	1 22 26	1 25 28	1 28 34	1 31 44	1 34 59	1 38 12	1 41 31	1 44 58	1 48 23	1 51 52	1 55 20	1 58 56	2 2 35	2 6 20
17	1 20 44	1 23 46	1 26 51	1 30 1	1 33 14	1 36 32	1 39 49	1 43 11	1 46 44	1 50 10	1 53 42	1 57 14	2 0 54	2 4 37	2 8 26
18	1 22 3	1 25 9	1 28 17	1 31 30	1 34 46	1 38 7	1 41 28	1 44 54	1 48 29	1 51 59	1 55 35	1 59 11	2 2 55	2 6 42	2 10 35
19	1 23 24	1 26 34	1 29 44	1 33 0	1 36 20	1 39 44	1 43 9	1 46 39	1 50 14	1 53 51	1 57 31	2 1 12	2 4 59	2 8 50	2 12 47
20	1 24 48	1 28 0	1 31 14	1 34 33	1 37 57	1 41 24	1 44 53	1 48 27	1 52 5	1 55 46	1 59 31	2 3 18	2 7 8	2 11 3	2 15 4
21	1 26 17	1 29 33	1 32 50	1 36 11	1 39 39	1 43 10	1 46 43	1 50 18	1 54 1	1 57 46	2 1 35	2 5 26	2 9 21	2 13 21	2 17 26
22	1 27 55	1 31 16	1 34 40	1 38 3	1 41 35	1 45 10	1 48 47	1 52 28	1 56 15	2 0 5	2 3 58	2 7 53	2 11 53	2 15 58	2 20 7
23	1 29 51	1 33 14	1 36 41	1 40 13	1 43 49	1 47 28	1 51 10	1 54 57	1 58 49	2 2 44	2 6 42	2 10 41	2 14 46	2 18 56	2 23 10

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 3 44	1 6 4	1 8 27	1 10 53	1 13 22	1 15 54	1 18 28	1 21 5	1 23 45	1 26 28	1 29 14	1 32 2	1 34 53	1 37 48	1 40 45
1	1 2 57	1 5 15	1 7 36	1 10 0	1 12 28	1 14 58	1 17 30	1 20 5	1 22 44	1 25 26	1 28 10	1 30 56	1 33 45	1 36 38	1 39 33
2	1 2 11	1 4 27	1 6 46	1 9 8	1 11 35	1 14 3	1 16 33	1 19 6	1 21 44	1 24 25	1 27 6	1 29 51	1 32 38	1 35 29	1 38 22
3	1 1 26	1 3 40	1 5 57	1 8 17	1 10 43	1 13 9	1 15 37	1 18 9	1 20 45	1 23 24	1 26 3	1 28 46	1 31 32	1 34 21	1 37 12
4	1 0 42	1 2 55	1 5 10	1 7 28	1 9 52	1 12 16	1 14 42	1 17 13	1 19 47	1 22 24	1 25 1	1 27 42	1 30 26	1 33 13	1 36 2
5	1 0 0	1 2 11	1 4 25	1 6 41	1 9 2	1 11 25	1 13 49	1 16 18	1 18 50	1 21 25	1 24 0	1 26 39	1 29 21	1 32 6	1 34 53
6	0 59 19	1 1 29	1 3 41	1 5 55	1 8 14	1 10 36	1 12 58	1 15 25	1 17 54	1 20 27	1 23 0	1 25 37	1 28 17	1 31 0	1 33 45
7	0 58 40	1 0 48	1 2 58	1 5 11	1 7 28	1 9 48	1 12 8	1 14 33	1 17 0	1 19 31	1 22 2	1 24 37	1 27 15	1 29 56	1 32 39
8	0 58 2	1 0 8	1 2 16	1 4 28	1 6 44	1 9 2	1 11 20	1 13 43	1 16 8	1 18 37	1 21 6	1 23 39	1 26 15	1 28 54	1 31 35
9	0 57 25	0 59 29	1 1 35	1 3 46	1 6 1	1 8 17	1 10 33	1 12 54	1 15 18	1 17 45	1 20 12	1 22 43	1 25 17	1 27 55	1 30 32
10	0 56 48	0 58 51	1 0 56	1 3 5	1 5 18	1 7 32	1 9 47	1 12 6	1 14 29	1 16 54	1 19 19	1 21 48	1 24 20	1 26 54	1 29 30
11	0 56 11	0 58 13	1 0 17	1 2 24	1 4 35	1 6 47	1 9 1	1 11 18	1 13 39	1 16 3	1 18 26	1 20 54	1 23 24	1 25 56	1 28 30
12	0 55 34	0 57 35	0 59 38	1 1 43	1 3 52	1 6 2	1 8 14	1 10 30	1 12 49	1 15 12	1 17 33	1 20 0	1 22 28	1 24 58	1 27 30
13	0 54 57	0 56 57	0 58 58	1 1 1	1 3 8	1 5 16	1 7 27	1 9 42	1 11 59	1 14 20	1 16 40	1 19 5	1 21 32	1 24 0	1 26 30
14	0 54 20	0 56 18	0 58 18	1 0 19	1 2 24	1 4 30	1 6 40	1 8 53	1 11 9	1 13 28	1 15 47	1 18 10	1 20 35	1 23 1	1 25 30
15	0 53 42	0 55 39	0 57 37	0 59 36	1 1 39	1 3 44	1 5 53	1 8 4	1 10 18	1 12 36	1 14 53	1 17 15	1 19 38	1 22 2	1 24 30
16	0 53 3	0 54 59	0 56 55	0 58 53	1 0 54	1 2 58	1 5 5	1 7 15	1 9 27	1 11 43	1 13 59	1 16 19	1 18 41	1 21 3	1 23 30
17	0 52 23	0 54 18	0 56 13	0 58 10	1 0 9	1 2 12	1 4 17	1 6 25	1 8 36	1 10 50	1 13 5	1 15 23	1 17 43	1 20 4	1 22 30
18	0 51 43	0 53 36	0 55 30	0 57 26	0 59 24	1 1 25	1 3 29	1 5 35	1 7 45	1 9 57	1 12 10	1 14 27	1 16 45	1 19 4	1 21 29
19	0 51 2	0 52 53	0 54 46	0 56 41	0 58 38	1 0 38	1 2 40	1 4 45	1 6 53	1 9 3	1 11 15	1 13 30	1 15 46	1 18 4	1 20 27
20	0 50 20	0 52 9	0 54 1	0 55 55	0 57 51	0 59 50	1 1 51	1 3 55	1 6 1	1 8 9	1 10 20	1 12 33	1 14 47	1 17 4	1 19 25
21	0 49 38	0 51 26	0 53 16	0 55 9	0 57 4	0 59 2	1 1 2	1 3 5	1 5 9	1 7 15	1 9 25	1 11 36	1 13 49	1 16 4	1 18 24
22	0 48 55	0 50 42	0 52 31	0 54 23	0 56 16	0 58 12	1 0 12	1 2 13	1 4 16	1 6 20	1 8 29	1 10 38	1 12 50	1 15 3	1 17 21
23	0 48 11	0 49 57	0 51 45	0 53 36	0 55 27	0 57 21	0 59 20	1 1 20	1 3 21	1 5 24	1 7 31	1 9 39	1 11 49	1 14 1	1 16 17

LATITUDE 53° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 6	0 10 11	0 10 18	0 10 29	0 10 42	0 10 58	0 11 18	0 11 40	0 12 5	0 12 33	0 13 4	0 13 38	0 14 15	0 14 55	0 15 37
1	0 10 9	0 10 14	0 10 21	0 10 32	0 10 45	0 11 2	0 11 22	0 11 44	0 12 10	0 12 37	0 13 10	0 13 43	0 14 21	0 15 1	0 15 44
2	0 10 12	0 10 17	0 10 24	0 10 35	0 10 48	0 11 5	0 11 26	0 11 48	0 12 15	0 12 41	0 13 15	0 13 48	0 14 27	0 15 7	0 15 51
3	0 10 15	0 10 20	0 10 27	0 10 38	0 10 51	0 11 8	0 11 30	0 11 52	0 12 19	0 12 45	0 13 20	0 13 53	0 14 33	0 15 13	0 15 58
4	0 10 18	0 10 23	0 10 30	0 10 41	0 10 54	0 11 11	0 11 34	0 11 56	0 12 23	0 12 49	0 13 25	0 13 58	0 14 39	0 15 20	0 16 5
5	0 10 21	0 10 26	0 10 33	0 10 44	0 10 57	0 11 14	0 11 37	0 12 0	0 12 27	0 12 53	0 13 30	0 14 4	0 14 45	0 15 27	0 16 12
6	0 10 23	0 10 29	0 10 36	0 10 47	0 11 0	0 11 17	0 11 40	0 12 4	0 12 31	0 12 58	0 13 35	0 14 10	0 14 51	0 15 34	0 16 19
7	0 10 25	0 10 32	0 10 39	0 10 50	0 11 3	0 11 20	0 11 43	0 12 8	0 12 35	0 13 3	0 13 40	0 14 16	0 14 57	0 15 41	0 16 27
8	0 10 27	0 10 34	0 10 42	0 10 53	0 11 6	0 11 23	0 11 46	0 12 12	0 12 39	0 13 8	0 13 45	0 14 22	0 15 3	0 15 48	0 16 35
9	0 10 29	0 10 36	0 10 44	0 10 55	0 11 9	0 11 26	0 11 49	0 12 15	0 12 43	0 13 13	0 13 50	0 14 28	0 15 9	0 15 55	0 16 43
10	0 10 31	0 10 38	0 10 46	0 10 57	0 11 11	0 11 29	0 11 52	0 12 18	0 12 47	0 13 18	0 13 55	0 14 34	0 15 16	0 16 2	0 16 51
11	0 10 33	0 10 40	0 10 48	0 10 59	0 11 13	0 11 31	0 11 54	0 12 21	0 12 51	0 13 23	0 14 0	0 14 40	0 15 23	0 16 9	0 16 59
12	0 10 35	0 10 41	0 10 50	0 11 1	0 11 15	0 11 33	0 11 56	0 12 24	0 12 55	0 13 28	0 14 5	0 14 46	0 15 30	0 16 16	0 17 7
13	0 10 37	0 10 42	0 10 52	0 11 3	0 11 17	0 11 35	0 11 59	0 12 27	0 12 59	0 13 33	0 14 10	0 14 52	0 15 37	0 16 23	0 17 15
14	0 10 38	0 10 43	0 10 53	0 11 4	0 11 19	0 11 37	0 12 2	0 12 30	0 13 3	0 13 38	0 14 15	0 14 58	0 15 44	0 16 31	0 17 24
15	0 10 39	0 10 44	0 10 54	0 11 5	0 11 21	0 11 39	0 12 5	0 12 33	0 13 7	0 13 43	0 14 21	0 15 4	0 15 51	0 16 39	0 17 33
16	0 10 40	0 10 45	0 10 55	0 11 7	0 11 23	0 11 42	0 12 8	0 12 36	0 13 11	0 13 48	0 14 27	0 15 10	0 15 58	0 16 47	0 17 42
17	0 10 41	0 10 47	0 10 57	0 11 9	0 11 25	0 11 45	0 12 11	0 12 39	0 13 15	0 13 53	0 14 33	0 15 16	0 16 5	0 16 55	0 17 51
18	0 10 43	0 10 49	0 10 59	0 11 11	0 11 28	0 11 48	0 12 15	0 12 43	0 13 20	0 13 58	0 14 39	0 15 23	0 16 12	0 17 3	0 18 1
19	0 10 45	0 10 51	0 11 2	0 11 14	0 11 31	0 11 52	0 12 19	0 12 48	0 13 25	0 14 4	0 14 45	0 15 30	0 16 19	0 17 12	0 18 11
20	0 10 48	0 10 54	0 11 5	0 11 17	0 11 34	0 11 56	0 12 23	0 12 54	0 13 31	0 14 10	0 14 52	0 15 38	0 16 27	0 17 22	0 18 22
21	0 10 52	0 10 58	0 11 10	0 11 22	0 11 39	0 12 2	0 12 29	0 13 1	0 13 39	0 14 17	0 15 1	0 15 47	0 16 37	0 17 34	0 18 34
22	0 10 56	0 11 3	0 11 15	0 11 28	0 11 45	0 12 9	0 12 36	0 13 9	0 13 47	0 14 25	0 15 11	0 15 57	0 16 50	0 17 48	0 18 49
23	0 11 1	0 11 8	0 11 20	0 11 35	0 11 51	0 12 18	0 12 44	0 13 19	0 13 54	0 14 34	0 15 22	0 16 9	0 17 5	0 18 5	0 19 8

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 10 6	0 10 11	0 10 18	0 10 29	0 10 42	0 10 58	0 11 18	0 11 40	0 12 5	0 12 33	0 13 4	0 13 38	0 14 15	0 14 55	0 15 37
1	0 10 3	0 10 8	0 10 15	0 10 26	0 10 38	0 10 54	0 11 14	0 11 36	0 12 1	0 12 28	0 12 59	0 13 32	0 14 9	0 14 48	0 15 30
2	0 10 0	0 10 5	0 10 12	0 10 23	0 10 34	0 10 50	0 11 10	0 11 32	0 11 57	0 12 23	0 12 54	0 13 26	0 14 3	0 14 41	0 15 23
3	0 9 57	0 10 2	0 10 9	0 10 19	0 10 30	0 10 46	0 11 6	0 11 28	0 11 52	0 12 18	0 12 49	0 13 20	0 13 57	0 14 34	0 15 16
4	0 9 54	0 9 59	0 10 6	0 10 15	0 10 26	0 10 42	0 11 2	0 11 23	0 11 47	0 12 13	0 12 44	0 13 14	0 13 51	0 14 27	0 15 9
5	0 9 51	0 9 56	0 10 2	0 10 11	0 10 22	0 10 38	0 10 58	0 11 18	0 11 42	0 12 8	0 12 38	0 13 8	0 13 44	0 14 20	0 15 2
6	0 9 47	0 9 52	0 9 58	0 10 7	0 10 18	0 10 34	0 10 53	0 11 13	0 11 37	0 12 3	0 12 32	0 13 2	0 13 37	0 14 13	0 14 54
7	0 9 43	0 9 48	0 9 54	0 10 3	0 10 14	0 10 30	0 10 48	0 11 8	0 11 32	0 11 58	0 12 26	0 12 56	0 13 30	0 14 6	0 14 46
8	0 9 39	0 9 44	0 9 50	0 9 59	0 10 10	0 10 26	0 10 43	0 11 3	0 11 27	0 11 53	0 12 20	0 12 50	0 13 23	0 13 59	0 14 38
9	0 9 35	0 9 40	0 9 46	0 9 55	0 10 6	0 10 21	0 10 38	0 10 58	0 11 22	0 11 47	0 12 14	0 12 44	0 13 16	0 13 52	0 14 30
10	0 9 31	0 9 36	0 9 42	0 9 51	0 10 2	0 10 16	0 10 33	0 10 52	0 11 16	0 11 41	0 12 8	0 12 37	0 13 9	0 13 44	0 14 22
11	0 9 27	0 9 32	0 9 38	0 9 46	0 9 57	0 10 11	0 10 28	0 10 47	0 11 10	0 11 35	0 12 2	0 12 30	0 13 2	0 13 36	0 14 14
12	0 9 22	0 9 27	0 9 33	0 9 41	0 9 52	0 10 5	0 10 22	0 10 41	0 11 3	0 11 28	0 11 55	0 12 22	0 12 54	0 13 27	0 14 5
13	0 9 16	0 9 21	0 9 27	0 9 35	0 9 46	0 9 59	0 10 16	0 10 35	0 10 56	0 11 21	0 11 47	0 12 14	0 12 46	0 13 18	0 13 55
14	0 9 9	0 9 14	0 9 20	0 9 28	0 9 39	0 9 52	0 10 9	0 10 28	0 10 48	0 11 13	0 11 38	0 12 5	0 12 37	0 13 8	0 13 45
15	0 9 1	0 9 6	0 9 12	0 9 20	0 9 31	0 9 44	0 10 1	0 10 20	0 10 40	0 11 4	0 11 28	0 11 55	0 12 27	0 12 58	0 13 34
16	0 8 53	0 8 57	0 9 3	0 9 11	0 9 22	0 9 35	0 9 52	0 10 11	0 10 31	0 10 54	0 11 18	0 11 45	0 12 17	0 12 48	0 13 23
17	0 8 44	0 8 48	0 8 54	0 9 2	0 9 13	0 9 26	0 9 42	0 10 1	0 10 21	0 10 43	0 11 7	0 11 34	0 12 6	0 12 37	0 13 11
18	0 8 34	0 8 38	0 8 44	0 8 52	0 9 3	0 9 16	0 9 32	0 9 50	0 10 10	0 10 32	0 10 56	0 11 23	0 11 54	0 12 25	0 12 59
19	0 8 23	0 8 27	0 8 33	0 8 41	0 8 52	0 9 5	0 9 20	0 9 38	0 9 58	0 10 20	0 10 44	0 11 11	0 11 41	0 12 12	0 12 46
20	0 8 12	0 8 15	0 8 21	0 8 29	0 8 40	0 8 53	0 9 7	0 9 25	0 9 45	0 10 7	0 10 31	0 10 58	0 11 27	0 11 58	0 12 32
21	0 7 59	0 8 2	0 8 8	0 8 16	0 8 27	0 8 39	0 8 54	0 9 11	0 9 31	0 9 53	0 10 17	0 10 44	0 11 12	0 11 43	0 12 16
22	0 7 44	0 7 47	0 7 53	0 8 1	0 8 12	0 8 24	0 8 39	0 8 56	0 9 15	0 9 37	0 10 1	0 10 28	0 10 56	0 11 26	0 11 58
23	0 7 28	0 7 31	0 7 37	0 7 45	0 7 55	0 8 7	0 8 22	0 8 39	0 8 58	0 9 19	0 9 43	0 10 9	0 10 37	0 11 7	0 11 39

LATITUDE 53° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 16 23	0 17 12	0 18 4	0 18 58	0 19 56	0 20 55	0 22 0	0 23 6	0 24 15	0 25 27	0 26 42	0 28 0	0 29 21	0 30 45	0 32 11
1	0 16 31	0 17 20	0 18 13	0 19 8	0 20 7	0 21 6	0 22 12	0 23 19	0 24 29	0 25 42	0 26 58	0 28 17	0 29 39	0 31 4	0 32 31
2	0 16 39	0 17 28	0 18 22	0 19 18	0 20 18	0 21 17	0 22 24	0 23 32	0 24 43	0 25 57	0 27 14	0 28 34	0 29 57	0 31 23	0 32 51
3	0 16 47	0 17 37	0 18 31	0 19 28	0 20 29	0 21 29	0 22 36	0 23 46	0 24 58	0 26 13	0 27 31	0 28 52	0 30 16	0 31 43	0 33 12
4	0 16 55	0 17 46	0 18 40	0 19 38	0 20 40	0 21 41	0 22 49	0 24 0	0 25 13	0 26 29	0 27 48	0 29 10	0 30 35	0 32 3	0 33 33
5	0 17 3	0 17 55	0 18 50	0 19 48	0 20 51	0 21 53	0 23 2	0 24 14	0 25 28	0 26 45	0 28 5	0 29 28	0 30 55	0 32 24	0 33 55
6	0 17 11	0 18 4	0 19 0	0 19 59	0 21 2	0 22 6	0 23 16	0 24 28	0 25 43	0 27 2	0 28 23	0 29 47	0 31 15	0 32 45	0 34 18
7	0 17 19	0 18 13	0 19 10	0 20 10	0 21 14	0 22 19	0 23 30	0 24 43	0 25 59	0 27 19	0 28 41	0 30 6	0 31 35	0 33 7	0 34 41
8	0 17 27	0 18 22	0 19 20	0 20 21	0 21 26	0 22 32	0 23 44	0 24 58	0 26 15	0 27 36	0 29 0	0 30 26	0 31 56	0 33 29	0 35 5
9	0 17 35	0 18 31	0 19 30	0 20 32	0 21 38	0 22 46	0 23 59	0 25 14	0 26 32	0 27 54	0 29 19	0 30 46	0 32 18	0 33 52	0 35 30
10	0 17 44	0 18 40	0 19 40	0 20 43	0 21 50	0 23 0	0 24 14	0 25 30	0 26 49	0 28 12	0 29 38	0 31 7	0 32 40	0 34 16	0 35 56
11	0 17 53	0 18 50	0 19 51	0 20 55	0 22 3	0 23 14	0 24 29	0 25 46	0 27 6	0 28 30	0 29 58	0 31 28	0 33 2	0 34 40	0 36 22
12	0 18 2	0 19 0	0 20 2	0 21 7	0 22 16	0 23 28	0 24 44	0 26 2	0 27 24	0 28 49	0 30 19	0 31 50	0 33 25	0 35 5	0 36 49
13	0 18 11	0 19 10	0 20 13	0 21 19	0 22 29	0 23 43	0 25 0	0 26 19	0 27 42	0 29 8	0 30 41	0 32 13	0 33 50	0 35 31	0 37 17
14	0 18 20	0 19 20	0 20 24	0 21 31	0 22 43	0 23 58	0 25 16	0 26 37	0 28 1	0 29 29	0 31 4	0 32 37	0 34 16	0 35 58	0 37 46
15	0 18 30	0 19 31	0 20 36	0 21 44	0 22 57	0 24 13	0 25 32	0 26 55	0 28 21	0 29 51	0 31 28	0 33 2	0 34 43	0 36 26	0 38 16
16	0 18 40	0 19 42	0 20 48	0 21 57	0 23 11	0 24 29	0 25 49	0 27 14	0 28 42	0 30 14	0 31 52	0 33 28	0 35 11	0 36 55	0 38 47
17	0 18 51	0 19 54	0 21 1	0 22 11	0 23 26	0 24 45	0 26 7	0 27 34	0 29 4	0 30 38	0 32 17	0 33 55	0 35 40	0 37 26	0 39 19
18	0 19 2	0 20 6	0 21 14	0 22 25	0 23 42	0 25 2	0 26 26	0 27 55	0 29 27	0 31 3	0 32 43	0 34 23	0 36 10	0 37 58	0 39 52
19	0 19 14	0 20 19	0 21 28	0 22 40	0 23 58	0 25 20	0 26 46	0 28 17	0 29 51	0 31 29	0 33 10	0 34 53	0 36 41	0 38 31	0 40 26
20	0 19 26	0 20 32	0 21 42	0 22 56	0 24 15	0 25 39	0 27 7	0 28 40	0 30 16	0 31 56	0 33 38	0 35 24	0 37 13	0 39 5	0 41 2
21	0 19 40	0 20 47	0 21 59	0 23 14	0 24 34	0 26 1	0 27 30	0 29 4	0 30 42	0 32 24	0 34 8	0 35 57	0 37 48	0 39 42	0 41 42
22	0 19 56	0 21 5	0 22 19	0 23 36	0 24 57	0 26 26	0 27 56	0 29 31	0 31 10	0 32 54	0 34 41	0 36 33	0 38 27	0 40 24	0 42 27
23	0 20 14	0 21 26	0 22 41	0 24 1	0 25 24	0 26 53	0 28 26	0 30 1	0 31 42	0 33 28	0 35 19	0 37 13	0 39 10	0 41 12	0 43 18

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 16 23	0 17 12	0 18 4	0 18 58	0 19 56	0 20 55	0 22 0	0 23 6	0 24 15	0 25 27	0 26 42	0 28 0	0 29 21	0 30 45	0 32 11
1	0 16 15	0 17 4	0 17 55	0 18 49	0 19 46	0 20 44	0 21 49	0 22 54	0 24 2	0 25 13	0 26 27	0 27 44	0 29 4	0 30 27	0 31 52
2	0 16 7	0 16 56	0 17 46	0 18 40	0 19 36	0 20 33	0 21 38	0 22 42	0 23 49	0 24 59	0 26 12	0 27 28	0 28 47	0 30 9	0 31 33
3	0 15 59	0 16 48	0 17 37	0 18 30	0 19 26	0 20 22	0 21 26	0 22 30	0 23 36	0 24 45	0 25 57	0 27 12	0 28 30	0 29 51	0 31 14
4	0 15 51	0 16 39	0 17 28	0 18 20	0 19 16	0 20 11	0 21 14	0 22 18	0 23 23	0 24 31	0 25 42	0 26 56	0 28 13	0 29 33	0 30 55
5	0 15 43	0 16 30	0 17 19	0 18 10	0 19 6	0 20 0	0 21 2	0 22 6	0 23 10	0 24 17	0 25 27	0 26 40	0 27 56	0 29 15	0 30 36
6	0 15 35	0 16 21	0 17 10	0 18 0	0 18 55	0 19 49	0 20 50	0 21 53	0 22 57	0 24 3	0 25 12	0 26 24	0 27 39	0 28 57	0 30 17
7	0 15 27	0 16 12	0 17 1	0 17 50	0 18 44	0 19 38	0 20 38	0 21 40	0 22 44	0 23 49	0 24 57	0 26 8	0 27 22	0 28 39	0 29 58
8	0 15 19	0 16 3	0 16 51	0 17 40	0 18 33	0 19 27	0 20 26	0 21 27	0 22 30	0 23 35	0 24 42	0 25 52	0 27 5	0 28 21	0 29 39
9	0 15 11	0 15 54	0 16 41	0 17 30	0 18 22	0 19 16	0 20 14	0 21 14	0 22 16	0 23 20	0 24 27	0 25 36	0 26 48	0 28 3	0 29 20
10	0 15 2	0 15 45	0 16 31	0 17 20	0 18 11	0 19 5	0 20 2	0 21 1	0 22 2	0 23 5	0 24 11	0 25 19	0 26 31	0 27 45	0 29 1
11	0 14 53	0 15 36	0 16 21	0 17 10	0 18 0	0 18 53	0 19 49	0 20 47	0 21 48	0 22 50	0 23 55	0 25 2	0 26 13	0 27 27	0 28 42
12	0 14 44	0 15 27	0 16 11	0 17 0	0 17 49	0 18 41	0 19 36	0 20 33	0 21 33	0 22 34	0 23 39	0 24 45	0 25 55	0 27 9	0 28 23
13	0 14 34	0 15 17	0 16 0	0 16 49	0 17 37	0 18 28	0 19 22	0 20 18	0 21 18	0 22 18	0 23 23	0 24 28	0 25 37	0 26 50	0 28 3
14	0 14 24	0 15 7	0 15 49	0 16 37	0 17 24	0 18 15	0 19 8	0 20 3	0 21 3	0 22 2	0 23 6	0 24 10	0 25 18	0 26 30	0 27 43
15	0 14 13	0 14 56	0 15 37	0 16 24	0 17 10	0 18 1	0 18 54	0 19 48	0 20 47	0 21 45	0 22 49	0 23 52	0 24 59	0 26 10	0 27 23
16	0 14 2	0 14 44	0 15 25	0 16 11	0 16 56	0 17 47	0 18 39	0 19 32	0 20 31	0 21 28	0 22 31	0 23 34	0 24 40	0 25 50	0 27 2
17	0 13 50	0 14 31	0 15 12	0 15 57	0 16 42	0 17 32	0 18 23	0 19 16	0 20 14	0 21 11	0 22 13	0 23 15	0 24 21	0 25 30	0 26 41
18	0 13 37	0 14 17	0 14 58	0 15 42	0 16 27	0 17 16	0 18 7	0 18 59	0 19 56	0 20 53	0 21 54	0 22 56	0 24 1	0 25 9	0 26 19
19	0 13 23	0 14 2	0 14 43	0 15 26	0 16 11	0 16 59	0 17 50	0 18 42	0 19 38	0 20 35	0 21 35	0 22 37	0 23 41	0 24 48	0 25 57
20	0 13 8	0 13 46	0 14 27	0 15 10	0 15 55	0 16 42	0 17 32	0 18 24	0 19 19	0 20 16	0 21 15	0 22 16	0 23 20	0 24 26	0 25 34
21	0 12 52	0 13 29	0 14 10	0 14 53	0 15 38	0 16 24	0 17 13	0 18 5	0 18 59	0 19 55	0 20 54	0 21 54	0 22 57	0 24 3	0 25 10
22	0 12 34	0 13 11	0 13 51	0 14 34	0 15 18	0 16 4	0 16 53	0 17 44	0 18 37	0 19 33	0 20 31	0 21 30	0 22 32	0 23 37	0 24 44
23	0 12 14	0 12 51	0 13 30	0 14 12	0 14 56	0 15 41	0 16 30	0 17 20	0 18 13	0 19 8	0 20 5	0 21 4	0 22 5	0 23 9	0 24 15

LATITUDE 53° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 33 41	0 35 13	0 36 49	0 38 27	0 40 8	0 41 52	0 43 39	0 45 28	0 47 21	0 49 16	0 51 14	0 53 15	0 55 19	0 57 26	0 59 36
1	0 34 2	0 35 35	0 37 12	0 38 51	0 40 33	0 42 18	0 44 6	0 45 57	0 47 51	0 49 48	0 51 48	0 53 51	0 55 57	0 58 4	1 0 16
2	0 34 24	0 35 58	0 37 36	0 39 16	0 40 59	0 42 45	0 44 34	0 46 27	0 48 22	0 50 21	0 52 23	0 54 28	0 56 36	0 58 43	1 0 57
3	0 34 46	0 36 21	0 38 0	0 39 41	0 41 25	0 43 13	0 45 3	0 46 58	0 48 54	0 50 55	0 52 59	0 55 6	0 57 16	0 59 24	1 1 40
4	0 35 9	0 36 45	0 38 25	0 40 7	0 41 52	0 43 42	0 45 33	0 47 30	0 49 27	0 51 30	0 53 36	0 55 45	0 57 57	1 0 6	1 2 24
5	0 35 32	0 37 10	0 38 51	0 40 34	0 42 21	0 44 13	0 46 5	0 48 3	0 50 2	0 52 6	0 54 14	0 56 25	0 58 39	1 0 50	1 3 9
6	0 35 56	0 37 35	0 39 17	0 41 2	0 42 51	0 44 45	0 46 39	0 48 37	0 50 38	0 52 44	0 54 53	0 57 6	0 59 22	1 1 36	1 3 56
7	0 36 21	0 38 1	0 39 44	0 41 31	0 43 22	0 45 18	0 47 14	0 49 13	0 51 15	0 53 23	0 55 34	0 57 48	1 0 6	1 2 23	1 4 45
8	0 36 46	0 38 28	0 40 13	0 42 2	0 43 55	0 45 52	0 47 50	0 49 50	0 51 54	0 54 4	0 56 16	0 58 32	1 0 51	1 3 12	1 5 36
9	0 37 12	0 38 56	0 40 43	0 42 34	0 44 29	0 46 27	0 48 27	0 50 29	0 52 35	0 54 47	0 57 1	0 59 18	1 1 39	1 4 2	1 6 28
10	0 37 39	0 39 25	0 41 14	0 43 7	0 45 4	0 47 4	0 49 6	0 51 10	0 53 18	0 55 32	0 57 48	1 0 7	1 2 29	1 4 54	1 7 22
11	0 38 7	0 39 55	0 41 46	0 43 41	0 45 40	0 47 42	0 49 46	0 51 52	0 54 3	0 56 19	0 58 37	1 0 59	1 3 24	1 5 50	1 8 21
12	0 38 36	0 40 26	0 42 19	0 44 16	0 46 17	0 48 21	0 50 27	0 52 35	0 54 49	0 57 7	0 59 27	1 1 52	1 4 20	1 6 48	1 9 21
13	0 39 6	0 40 58	0 42 53	0 44 52	0 46 55	0 49 1	0 51 10	0 53 20	0 55 36	0 57 56	1 0 18	1 2 46	1 5 17	1 7 47	1 10 22
14	0 39 37	0 41 31	0 43 28	0 45 29	0 47 34	0 49 42	0 51 54	0 54 6	0 56 24	0 58 46	1 1 10	1 3 41	1 6 15	1 8 47	1 11 25
15	0 40 9	0 42 5	0 44 4	0 46 8	0 48 15	0 50 25	0 52 39	0 54 54	0 57 14	0 59 38	1 2 4	1 4 37	1 7 14	1 9 49	1 12 30
16	0 40 43	0 42 40	0 44 41	0 46 48	0 48 57	0 51 9	0 53 25	0 55 43	0 58 6	1 0 32	1 3 0	1 5 35	1 8 14	1 10 53	1 13 37
17	0 41 18	0 43 16	0 45 20	0 47 29	0 49 40	0 51 54	0 54 12	0 56 33	0 58 59	1 1 27	1 3 57	1 6 35	1 9 16	1 11 59	1 14 45
18	0 41 51	0 43 53	0 46 0	0 48 11	0 50 24	0 52 40	0 55 0	0 57 24	0 59 53	1 2 23	1 4 56	1 7 37	1 10 20	1 13 6	1 15 54
19	0 42 27	0 44 32	0 46 41	0 48 54	0 51 9	0 53 28	0 55 50	0 58 17	1 0 48	1 3 21	1 5 57	1 8 40	1 11 26	1 14 14	1 17 5
20	0 43 5	0 45 13	0 47 24	0 49 39	0 51 56	0 54 18	0 56 42	0 59 12	1 1 45	1 4 21	1 7 0	1 9 45	1 12 33	1 15 24	1 18 17
21	0 43 46	0 45 57	0 48 11	0 50 29	0 52 49	0 55 12	0 57 39	1 0 11	1 2 46	1 5 26	1 8 9	1 10 56	1 13 47	1 16 41	1 19 38
22	0 44 34	0 46 45	0 49 2	0 51 23	0 53 47	0 56 12	0 58 42	1 1 16	1 3 54	1 6 39	1 9 26	1 12 17	1 15 11	1 18 8	1 21 9
23	0 45 27	0 47 40	0 50 0	0 52 25	0 54 52	0 57 21	0 59 54	1 2 31	1 5 11	1 8 1	1 10 53	1 13 48	1 16 46	1 19 47	1 22 53

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 33 41	0 35 13	0 36 49	0 38 27	0 40 8	0 41 52	0 43 39	0 45 28	0 47 21	0 49 16	0 51 14	0 53 15	0 55 19	0 57 26	0 59 36
1	0 33 21	0 34 52	0 36 27	0 38 4	0 39 43	0 41 26	0 43 13	0 45 0	0 46 51	0 48 44	0 50 40	0 52 39	0 54 41	0 56 46	0 58 54
2	0 33 1	0 34 31	0 36 5	0 37 41	0 39 18	0 41 0	0 42 47	0 44 32	0 46 21	0 48 13	0 50 7	0 52 4	0 54 4	0 56 7	0 58 13
3	0 32 41	0 34 10	0 35 43	0 37 18	0 38 53	0 40 34	0 42 20	0 44 4	0 45 51	0 47 42	0 49 34	0 51 30	0 53 28	0 55 29	0 57 33
4	0 32 21	0 33 49	0 35 21	0 36 55	0 38 28	0 40 8	0 41 53	0 43 36	0 45 21	0 47 11	0 49 2	0 50 57	0 52 53	0 54 52	0 56 54
5	0 32 1	0 33 28	0 34 59	0 36 32	0 38 4	0 39 42	0 41 26	0 43 8	0 44 51	0 46 40	0 48 30	0 50 24	0 52 19	0 54 16	0 56 16
6	0 31 41	0 33 7	0 34 37	0 36 9	0 37 40	0 39 17	0 40 59	0 42 40	0 44 22	0 46 9	0 47 58	0 49 51	0 51 45	0 53 41	0 55 39
7	0 31 21	0 32 46	0 34 14	0 35 45	0 37 16	0 38 52	0 40 32	0 42 12	0 43 53	0 45 38	0 47 26	0 49 18	0 51 11	0 53 6	0 55 3
8	0 31 1	0 32 24	0 33 51	0 35 21	0 36 52	0 38 27	0 40 5	0 41 44	0 43 24	0 45 7	0 46 54	0 48 45	0 50 37	0 52 31	0 54 27
9	0 30 40	0 32 2	0 33 28	0 34 57	0 36 28	0 38 2	0 39 38	0 41 16	0 42 55	0 44 37	0 46 23	0 48 13	0 50 4	0 51 57	0 53 52
10	0 30 19	0 31 40	0 33 5	0 34 33	0 36 4	0 37 37	0 39 11	0 40 47	0 42 26	0 44 8	0 45 53	0 47 41	0 49 31	0 51 23	0 53 18
11	0 29 58	0 31 18	0 32 42	0 34 9	0 35 40	0 37 12	0 38 44	0 40 19	0 41 57	0 43 39	0 45 23	0 47 10	0 48 59	0 50 50	0 52 44
12	0 29 37	0 30 56	0 32 19	0 33 45	0 35 16	0 36 47	0 38 17	0 39 51	0 41 28	0 43 9	0 44 52	0 46 38	0 48 26	0 50 16	0 52 9
13	0 29 16	0 30 34	0 31 56	0 33 21	0 34 52	0 36 21	0 37 50	0 39 23	0 40 59	0 42 39	0 44 21	0 46 6	0 47 53	0 49 42	0 51 34
14	0 28 55	0 30 12	0 31 33	0 32 57	0 34 27	0 35 55	0 37 23	0 38 55	0 40 30	0 42 9	0 43 50	0 45 34	0 47 20	0 49 8	0 50 59
15	0 28 34	0 29 50	0 31 10	0 32 33	0 34 2	0 35 29	0 36 56	0 38 27	0 40 1	0 41 39	0 43 19	0 45 2	0 46 47	0 48 34	0 50 24
16	0 28 13	0 29 28	0 30 47	0 32 9	0 33 37	0 35 3	0 36 29	0 37 59	0 39 32	0 41 9	0 42 48	0 44 30	0 46 14	0 47 59	0 49 48
17	0 27 52	0 29 6	0 30 24	0 31 45	0 33 12	0 34 36	0 36 2	0 37 31	0 39 3	0 40 38	0 42 16	0 43 58	0 45 40	0 47 23	0 49 11
18	0 27 30	0 28 44	0 30 1	0 31 21	0 32 46	0 34 9	0 35 34	0 37 3	0 38 34	0 40 7	0 41 44	0 43 25	0 45 5	0 46 47	0 48 33
19	0 27 8	0 28 21	0 29 37	0 30 56	0 32 19	0 33 41	0 35 6	0 36 34	0 38 4	0 39 36	0 41 11	0 42 50	0 44 29	0 46 10	0 47 52
20	0 26 45	0 27 58	0 29 13	0 30 31	0 31 51	0 33 13	0 34 37	0 36 4	0 37 33	0 39 4	0 40 38	0 42 14	0 43 52	0 45 32	0 47 14
21	0 26 20	0 27 33	0 28 47	0 30 4	0 31 23	0 32 44	0 34 7	0 35 33	0 37 1	0 38 31	0 40 4	0 41 39	0 43 15	0 44 54	0 46 34
22	0 25 53	0 27 5	0 28 19	0 29 35	0 30 53	0 32 13	0 33 35	0 35 0	0 36 27	0 37 56	0 39 28	0 41 2	0 42 37	0 44 14	0 45 53
23	0 25 23	0 26 34	0 27 47	0 29 2	0 30 19	0 31 38	0 33 0	0 34 24	0 35 50	0 37 18	0 38 48	0 40 21	0 41 56	0 43 32	0 45 10

LATITUDE 53° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 1 48	1 4 3	1 6 21	1 8 42	1 11 5	1 13 31	1 16 0	1 18 32	1 21 7	1 23 44	1 26 24	1 29 7	1 31 52	1 34 40	1 37 32
1	1 2 29	1 4 46	1 7 6	1 9 29	1 11 54	1 14 17	1 16 48	1 19 22	1 22 0	1 24 39	1 27 21	1 30 7	1 32 54	1 35 44	1 38 35
2	1 3 11	1 5 31	1 7 53	1 10 18	1 12 45	1 15 5	1 17 39	1 20 15	1 22 56	1 25 36	1 28 21	1 31 9	1 33 58	1 36 50	1 39 42
3	1 3 55	1 6 17	1 8 41	1 11 8	1 13 38	1 15 57	1 18 33	1 21 11	1 23 54	1 26 36	1 29 23	1 32 13	1 35 5	1 37 59	1 40 52
4	1 4 41	1 7 5	1 9 31	1 12 0	1 14 32	1 16 52	1 19 30	1 22 10	1 24 55	1 27 39	1 30 28	1 33 20	1 36 15	1 39 11	1 42 6
5	1 5 28	1 7 54	1 10 22	1 12 53	1 15 27	1 17 49	1 20 29	1 23 12	1 25 59	1 28 45	1 31 36	1 34 30	1 37 28	1 40 26	1 43 23
6	1 6 17	1 8 45	1 11 15	1 13 48	1 16 24	1 18 50	1 21 32	1 24 17	1 27 6	1 29 54	1 32 47	1 35 43	1 38 44	1 41 44	1 44 44
7	1 7 8	1 9 38	1 12 10	1 14 45	1 17 23	1 19 53	1 22 37	1 25 24	1 28 15	1 31 6	1 34 0	1 36 59	1 40 2	1 43 5	1 46 8
8	1 8 1	1 10 33	1 13 7	1 15 44	1 18 24	1 20 59	1 23 45	1 26 34	1 29 27	1 32 21	1 35 17	1 38 18	1 41 23	1 44 29	1 47 36
9	1 8 55	1 11 29	1 14 6	1 16 45	1 19 27	1 22 8	1 24 56	1 27 47	1 30 42	1 33 39	1 36 38	1 39 41	1 42 48	1 45 57	1 49 8
10	1 9 52	1 12 27	1 15 7	1 17 49	1 20 33	1 23 19	1 26 9	1 29 2	1 31 59	1 35 0	1 38 3	1 41 8	1 44 17	1 47 28	1 50 44
11	1 10 52	1 13 29	1 16 11	1 18 55	1 21 42	1 24 32	1 27 24	1 30 20	1 33 21	1 36 25	1 39 31	1 42 39	1 45 51	1 49 5	1 52 24
12	1 11 54	1 14 34	1 17 18	1 20 4	1 22 54	1 25 48	1 28 42	1 31 42	1 34 46	1 37 53	1 41 2	1 44 13	1 47 28	1 50 45	1 54 7
13	1 12 58	1 15 41	1 18 27	1 21 16	1 24 9	1 27 6	1 30 3	1 33 6	1 36 13	1 39 23	1 42 35	1 45 49	1 49 7	1 52 27	1 55 55
14	1 14 4	1 16 50	1 19 39	1 22 31	1 25 27	1 28 26	1 31 26	1 34 32	1 37 42	1 40 55	1 44 10	1 47 27	1 50 48	1 54 11	1 57 43
15	1 15 12	1 18 1	1 20 53	1 23 48	1 26 47	1 29 48	1 32 51	1 36 0	1 39 13	1 42 29	1 45 47	1 49 7	1 52 31	1 55 57	1 59 33
16	1 16 22	1 19 14	1 22 9	1 25 7	1 28 9	1 31 12	1 34 18	1 37 30	1 40 46	1 44 5	1 47 26	1 50 49	1 54 16	1 57 46	2 1 25
17	1 17 33	1 20 28	1 23 26	1 26 27	1 29 32	1 32 38	1 35 47	1 39 2	1 42 21	1 45 43	1 49 7	1 52 33	1 56 4	1 59 38	2 3 19
18	1 18 45	1 21 43	1 24 44	1 27 48	1 30 56	1 34 6	1 37 18	1 40 36	1 43 58	1 47 23	1 50 50	1 54 20	1 57 55	2 1 33	2 5 16
19	1 19 59	1 23 0	1 26 4	1 29 11	1 32 22	1 35 36	1 38 51	1 42 12	1 45 37	1 49 5	1 52 36	1 56 10	1 59 48	2 3 30	2 7 16
20	1 21 16	1 24 20	1 27 27	1 30 37	1 33 51	1 37 8	1 40 27	1 43 51	1 47 19	1 50 50	1 54 25	1 58 3	2 1 44	2 5 29	2 9 17
21	1 22 41	1 25 47	1 28 56	1 32 9	1 35 28	1 38 44	1 42 7	1 45 34	1 49 5	1 52 39	1 56 19	2 0 1	2 3 46	2 7 35	2 11 27
22	1 24 16	1 27 25	1 30 36	1 33 52	1 37 18	1 40 36	1 44 5	1 47 36	1 51 10	1 54 47	1 58 32	2 2 18	2 6 7	2 10 0	2 13 57
23	1 26 3	1 29 15	1 32 30	1 35 50	1 39 19	1 42 50	1 46 22	1 49 57	1 53 34	1 57 14	2 1 4	2 4 55	2 8 48	2 12 46	2 16 48

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	1 1 48	1 4 3	1 6 21	1 8 42	1 11 5	1 13 31	1 16 0	1 18 32	1 21 7	1 23 44	1 26 24	1 29 7	1 31 52	1 34 40	1 37 32
1	1 1 5	1 3 22	1 5 38	1 7 57	1 10 18	1 12 42	1 15 9	1 17 39	1 20 12	1 22 47	1 25 26	1 28 7	1 30 50	1 33 35	1 36 25
2	1 0 23	1 2 41	1 4 55	1 7 12	1 9 31	1 11 53	1 14 18	1 16 46	1 19 17	1 21 50	1 24 28	1 27 7	1 29 48	1 32 30	1 35 19
3	0 59 42	1 2 0	1 4 12	1 6 27	1 8 44	1 11 4	1 13 28	1 15 54	1 18 23	1 20 54	1 23 31	1 26 8	1 28 47	1 31 26	1 34 13
4	0 59 2	1 1 19	1 3 29	1 5 43	1 7 58	1 10 16	1 12 38	1 15 2	1 17 29	1 19 58	1 22 34	1 25 9	1 27 46	1 30 23	1 33 8
5	0 58 23	1 0 38	1 2 47	1 4 59	1 7 12	1 9 28	1 11 49	1 14 11	1 16 36	1 19 3	1 21 38	1 24 11	1 26 46	1 29 21	1 32 4
6	0 57 44	0 59 57	1 2 5	1 4 15	1 6 26	1 8 40	1 11 2	1 13 20	1 15 43	1 18 8	1 20 42	1 23 13	1 25 46	1 28 20	1 31 1
7	0 57 6	0 59 16	1 1 23	1 3 31	1 5 41	1 7 54	1 10 12	1 12 30	1 14 51	1 17 14	1 19 47	1 22 16	1 24 47	1 27 20	1 29 59
8	0 56 28	0 58 35	1 0 41	1 2 48	1 4 57	1 7 8	1 9 24	1 11 41	1 14 0	1 16 22	1 18 52	1 21 19	1 23 48	1 26 21	1 28 58
9	0 55 51	0 57 55	0 59 59	1 2 5	1 4 13	1 6 23	1 8 37	1 10 53	1 13 11	1 15 32	1 17 58	1 20 24	1 22 52	1 25 23	1 27 58
10	0 55 15	0 57 15	0 59 17	1 1 22	1 3 29	1 5 38	1 7 51	1 10 6	1 12 23	1 14 43	1 17 5	1 19 30	1 21 57	1 24 26	1 26 59
11	0 54 40	0 56 36	0 58 36	1 0 40	1 2 46	1 4 54	1 7 5	1 9 19	1 11 35	1 13 53	1 16 13	1 18 37	1 21 2	1 23 30	1 26 1
12	0 54 4	0 55 58	0 57 56	0 59 59	1 2 3	1 4 10	1 6 19	1 8 32	1 10 46	1 13 3	1 15 21	1 17 44	1 20 7	1 22 34	1 25 3
13	0 53 27	0 55 19	0 57 16	0 59 18	1 1 20	1 3 26	1 5 33	1 7 45	1 9 57	1 12 13	1 14 29	1 16 51	1 19 12	1 21 38	1 24 5
14	0 52 50	0 54 40	0 56 36	0 58 37	1 0 37	1 2 42	1 4 47	1 6 58	1 9 8	1 11 23	1 13 37	1 15 58	1 18 17	1 20 41	1 23 7
15	0 52 12	0 54 1	0 55 56	0 57 56	0 59 54	1 1 58	1 4 1	1 6 10	1 8 19	1 10 33	1 12 45	1 15 5	1 17 22	1 19 44	1 22 9
16	0 51 34	0 53 22	0 55 16	0 57 14	0 59 11	1 1 13	1 3 15	1 5 22	1 7 30	1 9 42	1 11 53	1 14 11	1 16 27	1 18 47	1 21 11
17	0 50 56	0 52 43	0 54 36	0 56 32	0 58 28	1 0 28	1 2 29	1 4 34	1 6 41	1 8 51	1 11 1	1 13 17	1 15 32	1 17 50	1 20 12
18	0 50 17	0 52 4	0 53 55	0 55 50	0 57 45	0 59 43	1 1 43	1 3 46	1 5 52	1 8 0	1 10 9	1 12 23	1 14 37	1 16 53	1 19 13
19	0 49 38	0 51 24	0 53 14	0 55 7	0 57 1	0 58 58	1 0 57	1 2 58	1 5 3	1 7 9	1 9 17	1 11 29	1 13 41	1 15 56	1 18 14
20	0 48 58	0 50 44	0 52 33	0 54 24	0 56 17	0 58 13	1 0 10	1 2 10	1 4 14	1 6 18	1 8 24	1 10 35	1 12 45	1 14 59	1 17 15
21	0 48 17	0 50 2	0 51 50	0 53 40	0 55 32	0 57 27	0 59 23	1 1 22	1 3 24	1 5 27	1 7 32	1 9 40	1 11 49	1 14 2	1 16 15
22	0 47 35	0 49 19	0 51 5	0 52 54	0 54 45	0 56 38	0 58 33	1 0 31	1 2 31	1 4 33	1 6 37	1 8 43	1 10 51	1 13 2	1 15 13
23	0 46 50	0 48 33	0 50 18	0 52 5	0 53 54	0 55 45	0 57 39	0 59 36	1 1 35	1 3 36	1 5 38	1 7 42	1 9 49	1 11 58	1 14 9

LATITUDE 54° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m.	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 9 56	0 10 1	0 10 8	0 10 18	0 10 30	0 10 46	0 11 6	0 11 26	0 11 50	0 12 18	0 12 47	0 13 20	0 13 56	0 14 34	0 15 16
1	0 9 59	0 10 4	0 10 11	0 10 21	0 10 33	0 10 49	0 11 10	0 11 30	0 11 55	0 12 23	0 12 53	0 13 25	0 14 1	0 14 40	0 15 23
2	0 10 2	0 10 7	0 10 14	0 10 24	0 10 36	0 10 52	0 11 14	0 11 34	0 12 0	0 12 28	0 12 58	0 13 30	0 14 7	0 14 46	0 15 30
3	0 10 5	0 10 10	0 10 17	0 10 27	0 10 39	0 10 55	0 11 18	0 11 38	0 12 5	0 12 33	0 13 3	0 13 35	0 14 13	0 14 52	0 15 37
4	0 10 8	0 10 13	0 10 20	0 10 30	0 10 42	0 10 58	0 11 21	0 11 42	0 12 10	0 12 38	0 13 8	0 13 40	0 14 19	0 14 58	0 15 44
5	0 10 10	0 10 15	0 10 23	0 10 33	0 10 45	0 11 1	0 11 24	0 11 46	0 12 14	0 12 43	0 13 13	0 13 45	0 14 25	0 15 4	0 15 51
6	0 10 12	0 10 17	0 10 26	0 10 36	0 10 48	0 11 4	0 11 27	0 11 50	0 12 18	0 12 48	0 13 18	0 13 51	0 14 31	0 15 11	0 15 58
7	0 10 14	0 10 19	0 10 28	0 10 39	0 10 51	0 11 7	0 11 30	0 11 54	0 12 22	0 12 53	0 13 23	0 13 57	0 14 37	0 15 18	0 16 5
8	0 10 16	0 10 21	0 10 30	0 10 42	0 10 54	0 11 10	0 11 33	0 11 58	0 12 26	0 12 57	0 13 28	0 14 3	0 14 43	0 15 25	0 16 12
9	0 10 18	0 10 23	0 10 32	0 10 44	0 10 57	0 11 13	0 11 36	0 12 1	0 12 30	0 13 1	0 13 33	0 14 9	0 14 49	0 15 32	0 16 19
10	0 10 20	0 10 25	0 10 34	0 10 46	0 10 59	0 11 16	0 11 39	0 12 4	0 12 34	0 13 5	0 13 38	0 14 15	0 14 55	0 15 39	0 16 26
11	0 10 22	0 10 27	0 10 36	0 10 48	0 11 1	0 11 19	0 11 42	0 12 7	0 12 38	0 13 9	0 13 43	0 14 21	0 15 2	0 15 46	0 16 34
12	0 10 24	0 10 29	0 10 38	0 10 50	0 11 3	0 11 22	0 11 45	0 12 10	0 12 42	0 13 13	0 13 48	0 14 27	0 15 9	0 15 53	0 16 42
13	0 10 26	0 10 31	0 10 40	0 10 52	0 11 5	0 11 25	0 11 48	0 12 13	0 12 46	0 13 17	0 13 53	0 14 33	0 15 16	0 16 1	0 16 51
14	0 10 28	0 10 33	0 10 42	0 10 54	0 11 8	0 11 28	0 11 51	0 12 17	0 12 50	0 13 21	0 13 58	0 14 39	0 15 23	0 16 9	0 17 0
15	0 10 30	0 10 35	0 10 44	0 10 56	0 11 11	0 11 31	0 11 54	0 12 21	0 12 54	0 13 26	0 14 3	0 14 45	0 15 30	0 16 17	0 17 9
16	0 10 32	0 10 37	0 10 46	0 10 58	0 11 14	0 11 34	0 11 57	0 12 25	0 12 58	0 13 31	0 14 8	0 14 51	0 15 37	0 16 25	0 17 18
17	0 10 34	0 10 39	0 10 48	0 11 0	0 11 17	0 11 37	0 12 0	0 12 29	0 13 2	0 13 36	0 14 14	0 14 57	0 15 44	0 16 33	0 17 27
18	0 10 36	0 10 41	0 10 50	0 11 2	0 11 20	0 11 40	0 12 4	0 12 33	0 13 6	0 13 41	0 14 20	0 15 3	0 15 51	0 16 41	0 17 36
19	0 10 38	0 10 43	0 10 52	0 11 5	0 11 23	0 11 43	0 12 8	0 12 37	0 13 10	0 13 46	0 14 26	0 15 9	0 15 58	0 16 49	0 17 45
20	0 10 39	0 10 45	0 10 54	0 11 8	0 11 26	0 11 47	0 12 12	0 12 41	0 13 14	0 13 51	0 14 32	0 15 16	0 16 5	0 16 57	0 17 54
21	0 10 40	0 10 47	0 10 56	0 11 11	0 11 29	0 11 50	0 12 16	0 12 45	0 13 18	0 13 56	0 14 38	0 15 23	0 16 13	0 17 6	0 18 4
22	0 10 41	0 10 48	0 10 58	0 11 15	0 11 31	0 11 53	0 12 19	0 12 49	0 13 23	0 14 1	0 14 44	0 15 30	0 16 21	0 17 15	0 18 14
23	0 10 43	0 10 49	0 11 0	0 11 19	0 11 33	0 11 55	0 12 22	0 12 53	0 13 28	0 14 7	0 14 50	0 15 38	0 16 29	0 17 25	0 18 24

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 9 56	0 10 1	0 10 8	0 10 18	0 10 30	0 10 46	0 11 6	0 11 26	0 11 50	0 12 18	0 12 47	0 13 20	0 13 56	0 14 34	0 15 16
1	0 9 53	0 9 58	0 10 4	0 10 14	0 10 26	0 10 42	0 11 2	0 11 22	0 11 45	0 12 13	0 12 42	0 13 14	0 13 50	0 14 28	0 15 9
2	0 9 50	0 9 54	0 10 0	0 10 10	0 10 22	0 10 38	0 10 58	0 11 18	0 11 40	0 12 8	0 12 37	0 13 8	0 13 44	0 14 21	0 15 2
3	0 9 46	0 9 50	0 9 56	0 10 6	0 10 18	0 10 34	0 10 54	0 11 13	0 11 35	0 12 3	0 12 32	0 13 2	0 13 38	0 14 14	0 14 55
4	0 9 42	0 9 46	0 9 52	0 10 2	0 10 14	0 10 30	0 10 49	0 11 8	0 11 30	0 11 58	0 12 26	0 12 56	0 13 32	0 14 7	0 14 48
5	0 9 38	0 9 42	0 9 48	0 9 58	0 10 10	0 10 26	0 10 44	0 11 3	0 11 25	0 11 53	0 12 20	0 12 50	0 13 26	0 14 0	0 14 41
6	0 9 34	0 9 38	0 9 44	0 9 54	0 10 6	0 10 22	0 10 39	0 10 58	0 11 20	0 11 47	0 12 14	0 12 44	0 13 19	0 13 53	0 14 33
7	0 9 30	0 9 34	0 9 40	0 9 50	0 10 2	0 10 18	0 10 34	0 10 53	0 11 15	0 11 41	0 12 8	0 12 38	0 13 12	0 13 46	0 14 25
8	0 9 26	0 9 30	0 9 36	0 9 46	0 9 58	0 10 13	0 10 29	0 10 48	0 11 10	0 11 35	0 12 2	0 12 32	0 13 5	0 13 39	0 14 17
9	0 9 22	0 9 26	0 9 32	0 9 42	0 9 54	0 10 8	0 10 24	0 10 43	0 11 5	0 11 29	0 11 56	0 12 26	0 12 58	0 13 32	0 14 9
10	0 9 18	0 9 22	0 9 28	0 9 38	0 9 49	0 10 3	0 10 19	0 10 38	0 10 59	0 11 23	0 11 50	0 12 19	0 12 51	0 13 25	0 14 1
11	0 9 14	0 9 18	0 9 23	0 9 33	0 9 44	0 9 58	0 10 14	0 10 32	0 10 53	0 11 17	0 11 44	0 12 12	0 12 44	0 13 18	0 13 53
12	0 9 9	0 9 13	0 9 18	0 9 27	0 9 38	0 9 52	0 10 8	0 10 26	0 10 46	0 11 10	0 11 37	0 12 4	0 12 36	0 13 10	0 13 44
13	0 9 3	0 9 7	0 9 12	0 9 20	0 9 31	0 9 45	0 10 1	0 10 19	0 10 38	0 11 2	0 11 29	0 11 55	0 12 27	0 13 1	0 13 34
14	0 8 56	0 9 0	0 9 5	0 9 13	0 9 23	0 9 37	0 9 53	0 10 11	0 10 30	0 10 53	0 11 20	0 11 46	0 12 17	0 12 51	0 13 24
15	0 8 48	0 8 52	0 8 57	0 9 5	0 9 15	0 9 28	0 9 44	0 10 2	0 10 21	0 10 43	0 11 10	0 11 36	0 12 6	0 12 40	0 13 13
16	0 8 39	0 8 43	0 8 48	0 8 56	0 9 6	0 9 19	0 9 34	0 9 52	0 10 11	0 10 33	0 10 59	0 11 25	0 11 54	0 12 28	0 13 1
17	0 8 29	0 8 33	0 8 38	0 8 46	0 8 56	0 9 9	0 9 23	0 9 41	0 10 0	0 10 22	0 10 47	0 11 13	0 11 41	0 12 15	0 12 48
18	0 8 18	0 8 22	0 8 27	0 8 35	0 8 45	0 8 58	0 9 12	0 9 29	0 9 48	0 10 10	0 10 34	0 11 0	0 11 28	0 12 1	0 12 34
19	0 8 5	0 8 9	0 8 14	0 8 22	0 8 32	0 8 45	0 8 59	0 9 16	0 9 35	0 9 57	0 10 20	0 10 46	0 11 14	0 11 46	0 12 19
20	0 7 50	0 7 54	0 7 59	0 8 7	0 8 17	0 8 30	0 8 44	0 9 1	0 9 20	0 9 42	0 10 5	0 10 31	0 10 59	0 11 30	0 12 3
21	0 7 34	0 7 38	0 7 43	0 7 51	0 8 1	0 8 14	0 8 28	0 8 45	0 9 4	0 9 26	0 9 49	0 10 14	0 10 42	0 11 13	0 11 45
22	0 7 17	0 7 21	0 7 26	0 7 34	0 7 44	0 7 57	0 8 11	0 8 28	0 8 46	0 9 8	0 9 31	0 9 56	0 10 23	0 10 54	0 11 26
23	0 7 0	0 7 4	0 7 9	0 7 16	0 7 26	0 7 39	0 7 53	0 8 9	0 8 27	0 8 48	0 9 11	0 9 36	0 10 3	0 10 33	0 11 4

LATITUDE 54° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 15 59	0 16 47	0 17 37	0 18 29	0 19 25	0 20 23	0 21 24	0 22 28	0 23 35	0 24 44	0 25 57	0 27 12	0 28 30	0 29 51	0 31 14
1	0 16 6	0 16 55	0 17 46	0 18 38	0 19 35	0 20 34	0 21 36	0 22 41	0 23 49	0 24 59	0 26 13	0 27 29	0 28 48	0 30 10	0 31 35
2	0 16 13	0 17 3	0 17 55	0 18 47	0 19 45	0 20 45	0 21 48	0 22 54	0 24 3	0 25 14	0 26 29	0 27 46	0 29 6	0 30 29	0 31 56
3	0 16 20	0 17 11	0 18 4	0 18 57	0 19 55	0 20 56	0 22 0	0 23 7	0 24 17	0 25 29	0 26 45	0 28 3	0 29 24	0 30 48	0 31 17
4	0 16 28	0 17 19	0 18 13	0 19 7	0 20 5	0 21 7	0 22 12	0 23 20	0 24 31	0 25 44	0 27 1	0 28 20	0 29 42	0 31 8	0 31 38
5	0 16 36	0 17 27	0 18 22	0 19 17	0 20 16	0 21 18	0 22 24	0 23 33	0 24 45	0 26 0	0 27 18	0 28 38	0 30 1	0 31 28	0 31 59
6	0 16 44	0 17 35	0 18 31	0 19 27	0 20 27	0 21 30	0 22 36	0 23 46	0 24 59	0 26 16	0 27 35	0 28 56	0 30 20	0 31 48	0 32 20
7	0 16 52	0 17 43	0 18 40	0 19 37	0 20 38	0 21 42	0 22 49	0 24 0	0 25 14	0 26 32	0 27 52	0 29 14	0 30 39	0 32 8	0 32 41
8	0 17 0	0 17 52	0 18 49	0 19 47	0 20 49	0 21 54	0 23 2	0 24 14	0 25 29	0 26 48	0 28 9	0 29 32	0 30 58	0 32 28	0 33 2
9	0 17 8	0 18 1	0 18 58	0 19 57	0 21 0	0 22 6	0 23 15	0 24 28	0 25 44	0 27 4	0 28 26	0 29 50	0 31 17	0 32 48	0 33 23
10	0 17 16	0 18 10	0 19 7	0 20 7	0 21 11	0 22 18	0 23 28	0 24 42	0 25 59	0 27 20	0 28 43	0 30 8	0 31 36	0 33 8	0 34 44
11	0 17 25	0 18 20	0 19 17	0 20 18	0 21 23	0 22 31	0 23 42	0 24 57	0 26 15	0 27 37	0 29 1	0 30 27	0 31 57	0 33 30	0 35 7
12	0 17 34	0 18 30	0 19 28	0 20 30	0 21 36	0 22 45	0 23 57	0 25 13	0 26 32	0 27 55	0 29 20	0 30 47	0 32 19	0 33 53	0 35 31
13	0 17 44	0 18 41	0 19 39	0 20 42	0 21 49	0 22 59	0 24 12	0 25 30	0 26 50	0 28 14	0 29 40	0 31 8	0 32 42	0 34 17	0 35 56
14	0 17 54	0 18 52	0 19 51	0 20 55	0 22 3	0 23 14	0 24 28	0 25 47	0 27 9	0 28 34	0 30 1	0 31 30	0 33 6	0 34 42	0 36 22
15	0 18 4	0 19 3	0 20 3	0 21 8	0 22 17	0 23 29	0 24 44	0 26 5	0 27 28	0 28 55	0 30 23	0 31 53	0 33 31	0 35 8	0 36 50
16	0 18 14	0 19 14	0 20 15	0 21 21	0 22 31	0 23 44	0 25 1	0 26 23	0 27 48	0 29 16	0 30 46	0 32 17	0 33 57	0 35 35	0 37 19
17	0 18 24	0 19 25	0 20 27	0 21 34	0 22 45	0 24 0	0 25 19	0 26 42	0 28 8	0 29 38	0 31 9	0 32 42	0 34 23	0 36 3	0 37 49
18	0 18 34	0 19 36	0 20 40	0 21 48	0 23 0	0 24 17	0 25 37	0 27 2	0 28 29	0 30 0	0 31 33	0 33 8	0 34 50	0 36 32	0 38 20
19	0 18 44	0 19 47	0 20 53	0 22 2	0 23 16	0 24 34	0 25 56	0 27 22	0 28 50	0 30 22	0 31 57	0 33 35	0 35 18	0 37 3	0 38 53
20	0 18 54	0 19 58	0 21 6	0 22 17	0 23 33	0 24 52	0 26 16	0 27 43	0 29 12	0 30 45	0 32 22	0 34 2	0 35 47	0 37 35	0 39 27
21	0 19 5	0 20 10	0 21 19	0 22 32	0 23 50	0 25 10	0 26 36	0 28 5	0 29 35	0 31 10	0 32 50	0 34 32	0 36 18	0 38 10	0 40 3
22	0 19 16	0 20 23	0 21 33	0 22 48	0 24 7	0 25 29	0 26 57	0 28 27	0 30 0	0 31 38	0 33 20	0 35 4	0 36 53	0 38 48	0 40 43
23	0 19 28	0 20 36	0 21 48	0 23 4	0 24 25	0 25 49	0 27 18	0 28 50	0 30 27	0 32 8	0 33 53	0 35 40	0 37 33	0 39 29	0 41 28

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 15 59	0 16 47	0 17 37	0 18 29	0 19 25	0 20 23	0 21 24	0 22 28	0 23 35	0 24 44	0 25 57	0 27 12	0 28 30	0 29 51	0 31 14
1	0 15 52	0 16 39	0 17 28	0 18 20	0 19 15	0 20 13	0 21 13	0 22 16	0 23 22	0 24 31	0 25 43	0 26 57	0 28 14	0 29 34	0 30 56
2	0 15 45	0 16 31	0 17 19	0 18 11	0 19 5	0 20 2	0 21 2	0 22 4	0 23 9	0 24 18	0 25 29	0 26 42	0 27 58	0 29 17	0 30 38
3	0 15 37	0 16 23	0 17 10	0 18 2	0 18 55	0 19 51	0 20 51	0 21 52	0 22 56	0 24 5	0 25 15	0 26 27	0 27 42	0 29 0	0 30 20
4	0 15 29	0 16 15	0 17 1	0 17 53	0 18 45	0 19 40	0 20 40	0 21 40	0 22 43	0 23 51	0 25 1	0 26 12	0 27 26	0 28 43	0 30 2
5	0 15 21	0 16 7	0 16 52	0 17 43	0 18 35	0 19 29	0 20 29	0 21 28	0 22 30	0 23 37	0 24 46	0 25 57	0 27 10	0 28 26	0 29 44
6	0 15 13	0 15 58	0 16 43	0 17 33	0 18 25	0 19 18	0 20 17	0 21 16	0 22 17	0 23 23	0 24 31	0 25 42	0 26 54	0 28 9	0 29 26
7	0 15 5	0 15 49	0 16 34	0 17 23	0 18 15	0 19 7	0 20 5	0 21 4	0 22 4	0 23 9	0 24 16	0 25 26	0 26 38	0 27 52	0 29 8
8	0 14 57	0 15 40	0 16 25	0 17 13	0 18 5	0 18 56	0 19 53	0 20 51	0 21 51	0 22 55	0 24 1	0 25 10	0 26 21	0 27 35	0 28 50
9	0 14 49	0 15 31	0 16 16	0 17 3	0 17 54	0 18 45	0 19 41	0 20 38	0 21 38	0 22 41	0 23 46	0 24 54	0 26 4	0 27 17	0 28 32
10	0 14 41	0 15 22	0 16 7	0 16 53	0 17 43	0 18 34	0 19 29	0 20 25	0 21 25	0 22 27	0 23 31	0 24 38	0 25 47	0 26 59	0 28 14
11	0 14 32	0 15 13	0 15 58	0 16 43	0 17 32	0 18 23	0 19 17	0 20 12	0 21 12	0 22 13	0 23 16	0 24 22	0 25 30	0 26 41	0 27 55
12	0 14 22	0 15 3	0 15 48	0 16 32	0 17 20	0 18 11	0 19 4	0 19 58	0 20 58	0 21 58	0 23 0	0 24 5	0 25 12	0 26 23	0 27 36
13	0 14 11	0 14 52	0 15 37	0 16 20	0 17 7	0 17 58	0 18 50	0 19 43	0 20 43	0 21 42	0 22 43	0 23 48	0 24 54	0 26 4	0 27 16
14	0 14 0	0 14 41	0 15 25	0 16 7	0 16 53	0 17 44	0 18 35	0 19 28	0 20 27	0 21 25	0 22 26	0 23 30	0 24 35	0 25 45	0 26 56
15	0 13 48	0 14 29	0 15 12	0 15 53	0 16 39	0 17 29	0 18 20	0 19 12	0 20 10	0 21 8	0 22 8	0 23 12	0 24 16	0 25 25	0 26 35
16	0 13 35	0 14 16	0 14 58	0 15 39	0 16 24	0 17 14	0 18 4	0 18 56	0 19 53	0 20 50	0 21 50	0 22 53	0 23 56	0 25 4	0 26 14
17	0 13 22	0 14 2	0 14 43	0 15 24	0 16 9	0 16 58	0 17 48	0 18 39	0 19 35	0 20 32	0 21 31	0 22 33	0 23 36	0 24 43	0 25 52
18	0 13 8	0 13 47	0 14 27	0 15 9	0 15 53	0 16 41	0 17 31	0 18 22	0 19 17	0 20 13	0 21 11	0 22 13	0 23 15	0 24 21	0 25 29
19	0 12 53	0 13 31	0 14 11	0 14 53	0 15 37	0 16 24	0 17 13	0 18 4	0 18 58	0 19 53	0 20 51	0 21 52	0 22 54	0 23 59	0 25 6
20	0 12 37	0 13 15	0 13 54	0 14 36	0 15 20	0 16 6	0 16 54	0 17 45	0 18 38	0 19 33	0 20 30	0 21 30	0 22 32	0 23 36	0 24 42
21	0 12 19	0 12 57	0 13 35	0 14 17	0 15 1	0 15 46	0 16 34	0 17 24	0 18 16	0 19 11	0 20 8	0 21 7	0 22 8	0 23 11	0 24 17
22	0 12 0	0 12 37	0 13 15	0 13 56	0 14 39	0 15 24	0 16 12	0 17 1	0 17 53	0 18 47	0 19 43	0 20 42	0 21 42	0 22 44	0 23 50
23	0 11 38	0 12 14	0 12 52	0 13 33	0 14 15	0 15 0	0 15 47	0 16 36	0 17 27	0 18 20	0 19 16	0 20 14	0 21 14	0 22 16	0 23 20

LATITUDE 54° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 32 40	0 34 10	0 35 42	0 37 16	0 38 53	0 40 34	0 42 17	0 44 3	0 45 51	0 47 43	0 49 37	0 51 33	0 53 33	0 55 35	0 57 40
1	0 33 1	0 34 32	0 36 5	0 37 40	0 39 18	0 41 0	0 42 44	0 44 31	0 46 20	0 48 13	0 50 8	0 52 5	0 54 6	0 56 10	0 58 17
2	0 33 22	0 34 54	0 36 28	0 38 4	0 39 43	0 41 27	0 43 12	0 45 0	0 46 50	0 48 44	0 50 40	0 52 38	0 54 40	0 56 46	0 58 54
3	0 33 43	0 35 16	0 37 1	0 38 29	0 40 9	0 41 54	0 43 40	0 45 30	0 47 21	0 49 16	0 51 13	0 53 13	0 55 16	0 57 24	0 59 33
4	0 34 4	0 35 38	0 37 25	0 38 54	0 40 35	0 42 22	0 44 9	0 46 1	0 47 53	0 49 49	0 51 47	0 53 49	0 55 54	0 58 4	1 0 14
5	0 34 26	0 36 1	0 37 49	0 39 20	0 41 2	0 42 50	0 44 38	0 46 32	0 48 26	0 50 23	0 52 23	0 54 26	0 56 33	0 58 45	1 0 57
6	0 34 48	0 36 24	0 38 13	0 39 46	0 41 30	0 43 19	0 45 8	0 47 4	0 49 0	0 50 59	0 53 1	0 55 5	0 57 14	0 59 27	1 1 41
7	0 35 10	0 36 48	0 38 38	0 40 13	0 41 59	0 43 49	0 45 40	0 47 37	0 49 35	0 51 36	0 53 40	0 55 46	0 57 57	1 0 11	1 2 27
8	0 35 33	0 37 12	0 39 4	0 40 41	0 42 29	0 44 20	0 46 13	0 48 11	0 50 11	0 52 14	0 54 20	0 56 28	0 58 41	1 0 57	1 3 15
9	0 35 57	0 37 37	0 39 31	0 41 10	0 43 0	0 44 52	0 46 47	0 48 46	0 50 48	0 52 53	0 55 1	0 57 11	0 59 26	1 1 44	1 4 4
10	0 36 22	0 38 3	0 39 49	0 41 39	0 43 31	0 45 25	0 47 22	0 49 22	0 51 26	0 53 33	0 55 44	0 57 56	1 0 13	1 2 33	1 4 55
11	0 36 48	0 38 31	0 40 18	0 42 9	0 44 3	0 45 59	0 47 58	0 50 0	0 52 6	0 54 15	0 56 28	0 58 42	1 1 1	1 3 23	1 5 48
12	0 37 15	0 39 0	0 40 48	0 42 40	0 44 36	0 46 34	0 48 35	0 50 39	0 52 47	0 54 58	0 57 13	0 59 29	1 1 50	1 4 14	1 6 42
13	0 37 43	0 39 30	0 41 20	0 43 13	0 45 10	0 47 10	0 49 14	0 51 20	0 53 30	0 55 43	0 58 0	1 0 18	1 2 41	1 5 7	1 7 37
14	0 38 12	0 40 1	0 41 53	0 43 48	0 45 46	0 47 48	0 49 54	0 52 2	0 54 14	0 56 30	0 58 49	1 1 9	1 3 34	1 6 2	1 8 34
15	0 38 41	0 40 33	0 42 27	0 44 24	0 46 24	0 48 28	0 50 36	0 52 46	0 55 0	0 57 18	0 59 40	1 2 2	1 4 29	1 6 59	1 9 33
16	0 39 12	0 41 6	0 43 2	0 45 1	0 47 3	0 49 9	0 51 19	0 53 31	0 55 47	0 58 7	1 0 32	1 2 56	1 5 25	1 7 58	1 10 34
17	0 39 44	0 41 40	0 43 38	0 45 39	0 47 43	0 49 51	0 52 3	0 54 17	0 56 35	0 58 58	1 1 25	1 3 52	1 6 23	1 8 59	1 11 37
18	0 40 17	0 42 15	0 44 15	0 46 18	0 48 24	0 50 34	0 52 48	0 55 4	0 57 25	0 59 50	1 2 19	1 4 49	1 7 23	1 10 1	1 12 42
19	0 40 51	0 42 51	0 44 53	0 46 58	0 49 6	0 51 18	0 53 34	0 55 53	0 58 17	1 0 44	1 3 15	1 5 48	1 8 25	1 11 5	1 13 49
20	0 41 26	0 43 28	0 45 32	0 47 39	0 49 50	0 52 4	0 54 22	0 56 43	0 59 10	1 1 40	1 4 13	1 6 49	1 9 29	1 12 12	1 14 59
21	0 42 3	0 44 5	0 46 12	0 48 21	0 50 35	0 52 53	0 55 13	0 57 36	1 0 5	1 2 39	1 5 15	1 7 53	1 10 36	1 13 23	1 16 13
22	0 42 44	0 44 46	0 46 56	0 49 7	0 51 24	0 53 46	0 56 8	0 58 33	1 1 5	1 3 42	1 6 21	1 9 1	1 11 48	1 14 39	1 17 32
23	0 43 30	0 45 32	0 47 44	0 49 58	0 52 18	0 54 43	0 57 9	0 59 35	1 2 10	1 4 51	1 7 33	1 10 16	1 13 6	1 16 1	1 18 57

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 32 40	0 34 10	0 35 42	0 37 16	0 38 53	0 40 34	0 42 17	0 44 3	0 45 51	0 47 43	0 49 37	0 51 33	0 53 33	0 55 35	0 57 40
1	0 32 22	0 33 50	0 35 22	0 36 55	0 38 31	0 40 11	0 41 53	0 43 37	0 45 24	0 47 15	0 49 8	0 51 3	0 53 2	0 55 2	0 57 5
2	0 32 3	0 33 30	0 35 2	0 36 34	0 38 9	0 39 48	0 41 29	0 43 11	0 44 57	0 46 47	0 48 39	0 50 33	0 52 30	0 54 29	0 56 30
3	0 31 44	0 33 10	0 34 42	0 36 13	0 37 47	0 39 25	0 41 4	0 42 35	0 44 30	0 46 18	0 48 9	0 50 3	0 51 58	0 53 56	0 55 55
4	0 31 25	0 32 50	0 34 21	0 35 51	0 37 24	0 39 1	0 40 39	0 42 9	0 44 3	0 45 49	0 47 39	0 49 32	0 51 26	0 53 22	0 55 20
5	0 31 6	0 32 30	0 34 0	0 35 29	0 37 1	0 38 37	0 40 14	0 41 43	0 43 36	0 45 20	0 47 9	0 49 1	0 50 54	0 52 48	0 54 45
6	0 30 47	0 32 10	0 33 39	0 35 7	0 36 38	0 38 13	0 39 49	0 41 17	0 43 8	0 44 51	0 46 39	0 48 30	0 50 21	0 52 14	0 54 10
7	0 30 28	0 31 50	0 33 18	0 34 45	0 36 15	0 37 48	0 39 23	0 40 50	0 42 40	0 44 22	0 46 9	0 47 58	0 49 48	0 51 40	0 53 35
8	0 30 9	0 31 30	0 32 56	0 34 22	0 35 51	0 37 23	0 38 57	0 40 23	0 42 12	0 43 53	0 45 39	0 47 26	0 49 15	0 51 6	0 53 0
9	0 29 50	0 31 10	0 32 34	0 33 59	0 35 27	0 36 58	0 38 31	0 39 56	0 41 44	0 43 24	0 45 8	0 46 54	0 48 42	0 50 32	0 52 25
10	0 29 31	0 30 50	0 32 12	0 33 36	0 35 3	0 36 33	0 38 5	0 39 39	0 41 16	0 42 55	0 44 37	0 46 22	0 48 9	0 49 58	0 51 49
11	0 29 11	0 30 29	0 31 50	0 33 13	0 34 39	0 36 8	0 37 39	0 39 12	0 40 47	0 42 25	0 44 6	0 45 50	0 47 36	0 49 23	0 51 13
12	0 28 51	0 30 8	0 31 28	0 32 50	0 34 15	0 35 43	0 37 13	0 38 45	0 40 18	0 41 55	0 43 35	0 45 18	0 47 3	0 48 48	0 50 37
13	0 28 30	0 29 46	0 31 5	0 32 27	0 33 51	0 35 18	0 36 47	0 38 18	0 39 49	0 41 25	0 43 4	0 44 46	0 46 29	0 48 13	0 50 1
14	0 28 9	0 29 24	0 30 42	0 32 3	0 33 26	0 34 52	0 36 20	0 37 50	0 39 20	0 40 55	0 42 33	0 44 13	0 45 55	0 47 38	0 49 25
15	0 27 47	0 29 1	0 30 18	0 31 39	0 33 1	0 34 26	0 35 53	0 37 22	0 38 51	0 40 25	0 42 1	0 43 40	0 45 21	0 47 3	0 48 49
16	0 27 25	0 28 38	0 29 54	0 31 14	0 32 35	0 33 59	0 35 25	0 36 53	0 38 21	0 39 54	0 41 29	0 43 7	0 44 47	0 46 28	0 48 12
17	0 27 2	0 28 14	0 29 30	0 30 49	0 32 9	0 33 32	0 34 57	0 36 24	0 37 51	0 39 23	0 40 57	0 42 34	0 44 12	0 45 52	0 47 35
18	0 26 39	0 27 50	0 29 5	0 30 23	0 31 42	0 33 4	0 34 28	0 35 54	0 37 21	0 38 52	0 40 25	0 42 0	0 43 37	0 45 16	0 46 58
19	0 26 15	0 27 26	0 28 40	0 29 57	0 31 15	0 32 36	0 33 59	0 35 25	0 36 50	0 38 20	0 39 52	0 41 26	0 43 2	0 44 40	0 46 21
20	0 25 50	0 27 1	0 28 14	0 29 30	0 30 47	0 32 7	0 33 29	0 34 54	0 36 19	0 37 48	0 39 19	0 40 52	0 42 27	0 44 4	0 45 44
21	0 25 24	0 26 34	0 27 47	0 29 2	0 30 18	0 31 37	0 32 58	0 34 21	0 35 46	0 37 15	0 38 45	0 40 17	0 41 51	0 43 27	0 45 6
22	0 24 56	0 26 5	0 27 18	0 28 32	0 29 47	0 31 5	0 32 25	0 33 47	0 35 11	0 36 39	0 38 8	0 39 40	0 41 13	0 42 48	0 44 26
23	0 24 26	0 25 35	0 26 46	0 27 58	0 29 13	0 30 31	0 31 50	0 33 11	0 34 35	0 36 1	0 37 29	0 38 59	0 40 31	0 42 6	0 43 42

LATITUDE 54° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 59 48	1 1 58	1 4 11	1 6 27	1 8 45	1 11 7	1 13 31	1 15 57	1 18 29	1 20 58	1 23 32	1 26 9	1 28 49	1 31 32	1 34 17
1	1 0 26	1 2 37	1 4 52	1 7 9	1 9 29	1 11 53	1 14 19	1 16 47	1 19 21	1 21 52	1 24 28	1 27 7	1 29 49	1 32 35	1 35 22
2	1 1 5	1 3 17	1 5 34	1 7 52	1 10 14	1 12 40	1 15 8	1 17 39	1 20 15	1 22 48	1 25 26	1 28 7	1 30 51	1 33 40	1 36 29
3	1 1 45	1 3 59	1 6 18	1 8 38	1 11 1	1 13 28	1 15 58	1 18 33	1 21 11	1 23 46	1 26 26	1 29 9	1 31 55	1 34 46	1 37 38
4	1 2 27	1 4 43	1 7 4	1 9 26	1 11 50	1 14 19	1 16 51	1 19 29	1 22 9	1 24 46	1 27 28	1 30 13	1 33 1	1 35 54	1 38 48
5	1 3 11	1 5 29	1 7 52	1 10 16	1 12 42	1 15 12	1 17 46	1 20 27	1 23 8	1 25 48	1 28 32	1 31 19	1 34 9	1 37 4	1 40 0
6	1 3 57	1 6 17	1 8 42	1 11 8	1 13 36	1 16 8	1 18 44	1 21 27	1 24 9	1 26 52	1 29 38	1 32 27	1 35 19	1 38 16	1 41 14
7	1 4 45	1 7 7	1 9 34	1 12 2	1 14 32	1 17 6	1 19 44	1 22 28	1 25 12	1 27 58	1 30 46	1 33 37	1 36 31	1 39 30	1 42 30
8	1 5 35	1 7 59	1 10 28	1 12 58	1 15 30	1 18 6	1 20 46	1 23 31	1 26 17	1 29 6	1 31 56	1 34 49	1 37 45	1 40 46	1 43 48
9	1 6 26	1 8 53	1 11 24	1 13 56	1 16 30	1 19 8	1 21 50	1 24 36	1 27 24	1 30 15	1 33 8	1 36 3	1 39 2	1 42 5	1 45 9
10	1 7 20	1 9 49	1 12 22	1 14 56	1 17 32	1 20 12	1 22 56	1 25 43	1 28 33	1 31 26	1 34 21	1 37 20	1 40 22	1 43 27	1 46 34
11	1 8 15	1 10 46	1 13 22	1 15 58	1 18 36	1 21 19	1 24 5	1 26 52	1 29 45	1 32 41	1 35 39	1 38 40	1 41 45	1 44 53	1 48 3
12	1 9 11	1 11 44	1 14 23	1 17 2	1 19 42	1 22 28	1 25 16	1 28 4	1 31 0	1 33 59	1 37 0	1 40 4	1 43 12	1 46 23	1 49 36
13	1 10 9	1 12 44	1 15 25	1 18 7	1 20 50	1 23 39	1 26 29	1 29 19	1 32 18	1 35 20	1 38 24	1 41 31	1 44 42	1 47 56	1 51 12
14	1 11 9	1 13 46	1 16 29	1 19 14	1 22 0	1 24 52	1 27 45	1 30 37	1 33 38	1 36 43	1 39 50	1 43 0	1 46 14	1 49 31	1 52 50
15	1 12 11	1 14 50	1 17 35	1 20 23	1 23 12	1 26 7	1 29 3	1 31 57	1 35 1	1 38 9	1 41 19	1 44 32	1 47 49	1 51 9	1 54 31
16	1 13 15	1 15 56	1 18 43	1 21 34	1 24 26	1 27 24	1 30 23	1 33 19	1 36 26	1 39 37	1 42 50	1 46 6	1 49 26	1 52 49	1 56 14
17	1 14 21	1 17 4	1 19 53	1 22 47	1 25 42	1 28 43	1 31 45	1 34 44	1 37 54	1 41 8	1 44 24	1 47 43	1 51 6	1 54 32	1 58 0
18	1 15 28	1 18 14	1 21 6	1 24 2	1 27 0	1 30 4	1 33 9	1 36 12	1 39 25	1 42 42	1 46 1	1 49 23	1 52 49	1 56 18	1 59 49
19	1 16 37	1 19 27	1 22 22	1 25 20	1 28 21	1 31 27	1 34 35	1 37 43	1 40 59	1 44 19	1 47 41	1 51 6	1 54 35	1 58 7	2 1 41
20	1 17 49	1 20 43	1 23 40	1 26 40	1 29 44	1 32 52	1 36 3	1 39 17	1 42 36	1 45 59	1 49 24	1 52 52	1 56 24	1 59 59	2 3 37
21	1 19 6	1 22 3	1 25 3	1 28 6	1 31 14	1 34 25	1 37 37	1 40 57	1 44 19	1 47 45	1 51 13	1 54 44	1 58 19	2 1 58	2 5 40
22	1 20 29	1 23 29	1 26 32	1 29 38	1 32 50	1 36 4	1 39 21	1 42 44	1 46 9	1 49 38	1 53 10	1 56 44	2 0 23	2 4 6	2 7 53
23	1 21 58	1 25 1	1 28 8	1 31 19	1 34 34	1 37 52	1 41 14	1 44 40	1 48 9	1 51 41	1 55 17	1 58 56	2 2 39	2 6 26	2 10 18

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 59 48	1 1 58	1 4 11	1 6 27	1 8 45	1 11 7	1 13 31	1 15 57	1 18 29	1 20 58	1 23 32	1 26 9	1 28 49	1 31 32	1 34 17
1	0 59 12	1 1 20	1 3 31	1 5 45	1 8 0	1 10 20	1 12 42	1 15 7	1 17 37	1 20 5	1 22 37	1 25 12	1 27 50	1 30 31	1 33 15
2	0 58 36	1 0 41	1 2 51	1 5 3	1 7 15	1 9 33	1 11 53	1 14 17	1 16 45	1 19 12	1 21 42	1 24 15	1 26 51	1 29 30	1 32 13
3	0 58 0	1 0 3	1 2 11	1 4 21	1 6 31	1 8 47	1 11 5	1 13 28	1 15 54	1 18 20	1 20 48	1 23 19	1 25 53	1 28 30	1 31 12
4	0 57 24	0 59 25	1 1 31	1 3 39	1 5 47	1 8 1	1 10 17	1 12 39	1 15 3	1 17 28	1 19 54	1 22 23	1 24 55	1 27 30	1 30 11
5	0 56 47	0 58 47	1 0 51	1 2 57	1 5 4	1 7 16	1 9 30	1 11 51	1 14 13	1 16 37	1 19 1	1 21 28	1 23 58	1 26 31	1 29 11
6	0 56 10	0 58 9	1 0 11	1 2 16	1 4 21	1 6 32	1 8 44	1 11 3	1 13 23	1 15 46	1 18 8	1 20 33	1 23 1	1 25 32	1 28 11
7	0 55 33	0 57 31	0 59 31	1 1 35	1 3 39	1 5 48	1 7 59	1 10 16	1 12 34	1 14 55	1 17 16	1 19 39	1 22 5	1 24 34	1 27 12
8	0 54 56	0 56 53	0 58 52	1 0 54	1 2 57	1 5 5	1 7 15	1 9 30	1 11 46	1 14 5	1 16 25	1 18 47	1 21 11	1 23 38	1 26 14
9	0 54 19	0 56 15	0 58 13	1 0 13	1 2 15	1 4 22	1 6 31	1 8 44	1 10 59	1 13 16	1 15 35	1 17 56	1 20 19	1 22 44	1 25 17
10	0 53 42	0 55 37	0 57 34	0 59 32	1 1 34	1 3 40	1 5 48	1 7 59	1 10 12	1 12 27	1 14 45	1 17 5	1 19 27	1 21 52	1 24 21
11	0 53 5	0 54 59	0 56 55	0 58 52	1 0 53	1 2 58	1 5 5	1 7 15	1 9 26	1 11 39	1 13 56	1 16 15	1 18 35	1 20 58	1 23 26
12	0 52 28	0 54 21	0 56 16	0 58 12	1 0 12	1 2 16	1 4 22	1 6 31	1 8 40	1 10 51	1 13 7	1 15 25	1 17 43	1 20 4	1 22 31
13	0 51 51	0 53 43	0 55 37	0 57 32	0 59 31	1 1 34	1 3 39	1 5 47	1 7 54	1 10 3	1 12 18	1 14 35	1 16 51	1 19 10	1 21 35
14	0 51 14	0 53 4	0 54 57	0 56 51	0 58 49	1 0 52	1 2 55	1 5 2	1 7 7	1 9 15	1 11 28	1 13 44	1 15 58	1 18 16	1 20 39
15	0 50 36	0 52 25	0 54 17	0 56 10	0 58 7	1 0 9	1 2 11	1 4 17	1 6 20	1 8 26	1 10 38	1 12 53	1 15 5	1 17 21	1 19 42
16	0 49 58	0 51 46	0 53 37	0 55 29	0 57 25	0 59 26	1 1 27	1 3 31	1 5 33	1 7 37	1 9 48	1 12 1	1 14 12	1 16 26	1 18 45
17	0 49 20	0 51 7	0 52 57	0 54 48	0 56 43	0 58 43	1 0 42	1 2 44	1 4 45	1 6 48	1 8 57	1 11 8	1 13 18	1 15 31	1 17 48
18	0 48 42	0 50 28	0 52 17	0 54 7	0 56 1	0 57 59	0 59 57	1 1 57	1 3 57	1 5 59	1 8 6	1 10 15	1 12 24	1 14 36	1 16 51
19	0 48 4	0 49 49	0 51 37	0 53 26	0 55 18	0 57 14	0 59 11	1 1 9	1 3 8	1 5 9	1 7 14	1 9 21	1 11 29	1 13 40	1 15 53
20	0 47 26	0 49 10	0 50 57	0 52 45	0 54 36	0 56 29	0 58 24	1 0 20	1 2 18	1 4 18	1 6 21	1 8 26	1 10 33	1 12 43	1 14 55
21	0 46 47	0 48 29	0 50 15	0 52 2	0 53 51	0 55 42	0 57 35	0 59 29	1 1 27	1 3 25	1 5 26	1 7 30	1 9 37	1 11 46	1 13 57
22	0 46 6	0 47 47	0 49 31	0 51 17	0 53 4	0 54 53	0 56 44	0 58 36	1 0 34	1 2 30	1 4 30	1 6 33	1 8 39	1 10 47	1 12 57
23	0 45 21	0 47 2	0 48 45	0 50 39	0 52 15	0 54 2	0 55 51	0 57 42	0 59 37	1 1 33	1 3 32	1 5 34	1 7 39	1 9 46	1 11 54

LATITUDE 55° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 9 55	0 10 0	0 10 6	0 10 14	0 10 28	0 10 44	0 11 2	0 11 22	0 11 45	0 12 12	0 12 40	0 13 12	0 13 46	0 14 23	0 15 3
1	0 9 58	0 10 3	0 10 9	0 10 17	0 10 31	0 10 47	0 11 6	0 11 26	0 11 50	0 12 17	0 12 44	0 13 18	0 13 51	0 14 29	0 15 9
2	0 10 1	0 10 6	0 10 12	0 10 20	0 10 34	0 10 50	0 11 10	0 11 30	0 11 54	0 12 22	0 12 48	0 13 24	0 13 56	0 14 35	0 15 16
3	0 10 4	0 10 9	0 10 15	0 10 23	0 10 37	0 10 53	0 11 14	0 11 34	0 11 58	0 12 27	0 12 53	0 13 30	0 14 2	0 14 41	0 15 23
4	0 10 7	0 10 12	0 10 18	0 10 26	0 10 40	0 10 56	0 11 17	0 11 38	0 12 2	0 12 31	0 12 58	0 13 35	0 14 8	0 14 47	0 15 30
5	0 10 10	0 10 15	0 10 21	0 10 29	0 10 43	0 10 59	0 11 20	0 11 42	0 12 6	0 12 35	0 13 3	0 13 40	0 14 14	0 14 53	0 15 37
6	0 10 13	0 10 18	0 10 24	0 10 32	0 10 46	0 11 2	0 11 23	0 11 46	0 12 10	0 12 39	0 13 8	0 13 45	0 14 20	0 14 59	0 15 44
7	0 10 15	0 10 21	0 10 26	0 10 35	0 10 49	0 11 5	0 11 26	0 11 50	0 12 14	0 12 43	0 13 13	0 13 50	0 14 26	0 15 5	0 15 51
8	0 10 17	0 10 23	0 10 28	0 10 38	0 10 52	0 11 8	0 11 29	0 11 53	0 12 18	0 12 47	0 13 18	0 13 55	0 14 32	0 15 12	0 15 58
9	0 10 19	0 10 25	0 10 30	0 10 41	0 10 55	0 11 11	0 11 32	0 11 56	0 12 22	0 12 51	0 13 23	0 14 0	0 14 38	0 15 19	0 16 5
10	0 10 21	0 10 27	0 10 32	0 10 43	0 10 57	0 11 14	0 11 35	0 11 59	0 12 26	0 12 55	0 13 28	0 14 5	0 14 44	0 15 26	0 16 12
11	0 10 23	0 10 29	0 10 35	0 10 46	0 11 0	0 11 17	0 11 39	0 12 2	0 12 29	0 12 59	0 13 33	0 14 10	0 14 50	0 15 33	0 16 19
12	0 10 25	0 10 31	0 10 37	0 10 49	0 11 3	0 11 20	0 11 42	0 12 5	0 12 33	0 13 3	0 13 38	0 14 15	0 14 56	0 15 40	0 16 27
13	0 10 27	0 10 33	0 10 39	0 10 51	0 11 6	0 11 23	0 11 45	0 12 8	0 12 37	0 13 7	0 13 43	0 14 20	0 15 2	0 15 47	0 16 35
14	0 10 29	0 10 35	0 10 41	0 10 53	0 11 9	0 11 26	0 11 48	0 12 11	0 12 41	0 13 11	0 13 48	0 14 26	0 15 8	0 15 54	0 16 43
15	0 10 31	0 10 37	0 10 43	0 10 55	0 11 12	0 11 29	0 11 51	0 12 14	0 12 45	0 13 15	0 13 53	0 14 32	0 15 14	0 16 1	0 16 51
16	0 10 33	0 10 39	0 10 45	0 10 57	0 11 14	0 11 32	0 11 54	0 12 18	0 12 49	0 13 19	0 13 58	0 14 38	0 15 20	0 16 8	0 16 59
17	0 10 35	0 10 40	0 10 47	0 10 59	0 11 16	0 11 35	0 11 57	0 12 22	0 12 53	0 13 24	0 14 3	0 14 44	0 15 27	0 16 15	0 17 7
18	0 10 36	0 10 41	0 10 49	0 11 1	0 11 18	0 11 37	0 12 0	0 12 26	0 12 57	0 13 29	0 14 8	0 14 50	0 15 34	0 16 22	0 17 15
19	0 10 37	0 10 42	0 10 51	0 11 3	0 11 20	0 11 39	0 12 3	0 12 30	0 13 1	0 13 34	0 14 13	0 14 56	0 15 41	0 16 30	0 17 23
20	0 10 38	0 10 43	0 10 53	0 11 5	0 11 22	0 11 42	0 12 6	0 12 34	0 13 5	0 13 39	0 14 19	0 15 2	0 15 48	0 16 38	0 17 31
21	0 10 39	0 10 45	0 10 55	0 11 7	0 11 24	0 11 45	0 12 9	0 12 38	0 13 9	0 13 44	0 14 26	0 15 8	0 15 55	0 16 46	0 17 40
22	0 10 41	0 10 47	0 10 57	0 11 9	0 11 27	0 11 48	0 12 13	0 12 42	0 13 14	0 13 50	0 14 32	0 15 15	0 16 3	0 16 55	0 17 50
23	0 10 43	0 10 49	0 10 59	0 11 12	0 11 30	0 11 51	0 12 17	0 12 46	0 13 19	0 13 56	0 14 38	0 15 22	0 16 11	0 17 4	0 18 1

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 9 55	0 10 0	0 10 6	0 10 14	0 10 28	0 10 44	0 11 2	0 11 22	0 11 45	0 12 12	0 12 40	0 13 12	0 13 46	0 14 23	0 15 3
1	0 9 51	0 9 56	0 10 2	0 10 10	0 10 24	0 10 40	0 10 57	0 11 17	0 11 40	0 12 7	0 12 35	0 13 6	0 13 40	0 14 16	0 14 56
2	0 9 47	0 9 52	0 9 58	0 10 6	0 10 20	0 10 35	0 10 52	0 11 12	0 11 35	0 12 2	0 12 30	0 13 0	0 13 34	0 14 9	0 14 49
3	0 9 43	0 9 48	0 9 54	0 10 2	0 10 16	0 10 30	0 10 47	0 11 7	0 11 30	0 11 56	0 12 24	0 12 54	0 13 28	0 14 2	0 14 42
4	0 9 39	0 9 44	0 9 50	0 9 58	0 10 12	0 10 25	0 10 42	0 11 2	0 11 25	0 11 50	0 12 18	0 12 48	0 13 22	0 13 55	0 14 35
5	0 9 35	0 9 40	0 9 46	0 9 54	0 10 7	0 10 20	0 10 37	0 10 57	0 11 20	0 11 44	0 12 12	0 12 42	0 13 16	0 13 48	0 14 28
6	0 9 31	0 9 36	0 9 42	0 9 50	0 10 2	0 10 15	0 10 32	0 10 52	0 11 15	0 11 38	0 12 6	0 12 36	0 13 9	0 13 41	0 14 20
7	0 9 27	0 9 32	0 9 37	0 9 46	0 9 57	0 10 10	0 10 27	0 10 47	0 11 9	0 11 32	0 12 0	0 12 30	0 13 2	0 13 34	0 14 12
8	0 9 23	0 9 27	0 9 32	0 9 41	0 9 52	0 10 5	0 10 22	0 10 42	0 11 3	0 11 26	0 11 54	0 12 24	0 12 55	0 13 27	0 14 4
9	0 9 18	0 9 22	0 9 27	0 9 36	0 9 47	0 10 0	0 10 17	0 10 36	0 10 57	0 11 20	0 11 48	0 12 18	0 12 48	0 13 20	0 13 56
10	0 9 13	0 9 17	0 9 22	0 9 31	0 9 42	0 9 55	0 10 11	0 10 30	0 10 51	0 11 14	0 11 42	0 12 11	0 12 41	0 13 12	0 13 48
11	0 9 8	0 9 12	0 9 17	0 9 26	0 9 37	0 9 50	0 10 5	0 10 24	0 10 45	0 11 7	0 11 35	0 12 4	0 12 34	0 13 4	0 13 40
12	0 9 2	0 9 6	0 9 11	0 9 20	0 9 31	0 9 44	0 9 59	0 10 18	0 10 38	0 11 0	0 11 27	0 11 56	0 12 26	0 12 56	0 13 31
13	0 8 55	0 8 59	0 9 4	0 9 13	0 9 24	0 9 37	0 9 52	0 10 11	0 10 30	0 10 52	0 11 18	0 11 47	0 12 17	0 12 47	0 13 21
14	0 8 47	0 8 51	0 8 56	0 9 5	0 9 16	0 9 29	0 9 44	0 10 2	0 10 21	0 10 43	0 11 8	0 11 37	0 12 7	0 12 37	0 13 10
15	0 8 38	0 8 42	0 8 47	0 8 56	0 9 7	0 9 20	0 9 35	0 9 52	0 10 11	0 10 33	0 10 57	0 11 26	0 11 56	0 12 26	0 12 58
16	0 8 28	0 8 32	0 8 37	0 8 46	0 8 57	0 9 10	0 9 25	0 9 41	0 10 0	0 10 22	0 10 45	0 11 14	0 11 44	0 12 14	0 12 46
17	0 8 17	0 8 21	0 8 26	0 8 35	0 8 46	0 8 58	0 9 13	0 9 29	0 9 48	0 10 10	0 10 33	0 11 1	0 11 30	0 12 0	0 12 32
18	0 8 5	0 8 9	0 8 14	0 8 22	0 8 33	0 8 45	0 9 0	0 9 16	0 9 35	0 9 57	0 10 20	0 10 47	0 11 15	0 11 45	0 12 17
19	0 7 51	0 7 55	0 8 0	0 8 7	0 8 19	0 8 30	0 8 45	0 9 1	0 9 20	0 9 42	0 10 5	0 10 31	0 10 59	0 11 29	0 12 1
20	0 7 36	0 7 40	0 7 45	0 7 52	0 8 3	0 8 14	0 8 29	0 8 45	0 9 4	0 9 25	0 9 48	0 10 13	0 10 40	0 11 10	0 11 42
21	0 7 19	0 7 23	0 7 28	0 7 35	0 7 46	0 7 57	0 8 11	0 8 28	0 8 46	0 9 6	0 9 29	0 9 54	0 10 21	0 10 50	0 11 21
22	0 7 0	0 7 4	0 7 9	0 7 16	0 7 26	0 7 38	0 7 51	0 8 8	0 8 26	0 8 46	0 9 8	0 9 33	0 10 0	0 10 29	0 10 59
23	0 6 38	0 6 41	0 6 47	0 6 54	0 7 3	0 7 15	0 7 28	0 7 45	0 8 3	0 8 23	0 8 45	0 9 9	0 9 36	0 10 5	0 10 35

LATITUDE 55° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 15 46	0 16 31	0 17 19	0 18 10	0 19 3	0 19 59	0 20 58	0 22 0	0 23 4	0 24 11	0 25 21	0 26 34	0 27 49	0 29 6	0 30 27
1	0 15 53	0 16 39	0 17 27	0 18 18	0 19 12	0 20 9	0 21 8	0 22 12	0 23 17	0 24 25	0 25 36	0 26 50	0 28 6	0 29 24	0 30 46
2	0 16 0	0 16 47	0 17 35	0 18 27	0 19 21	0 20 19	0 21 19	0 22 24	0 23 30	0 24 39	0 25 51	0 27 6	0 28 23	0 29 42	0 31 5
3	0 16 7	0 16 55	0 17 43	0 18 36	0 19 30	0 20 29	0 21 30	0 22 36	0 23 43	0 24 53	0 26 6	0 27 22	0 28 40	0 30 0	0 31 25
4	0 16 14	0 17 3	0 17 51	0 18 45	0 19 40	0 20 39	0 21 41	0 22 48	0 23 56	0 25 7	0 26 21	0 27 38	0 28 57	0 30 18	0 31 45
5	0 16 22	0 17 11	0 18 0	0 18 54	0 19 50	0 20 49	0 21 52	0 23 0	0 24 9	0 25 22	0 26 36	0 27 54	0 29 14	0 30 37	0 32 5
6	0 16 30	0 17 19	0 18 9	0 19 3	0 20 0	0 20 59	0 22 3	0 23 12	0 24 23	0 25 37	0 26 52	0 28 10	0 29 31	0 30 56	0 32 25
7	0 16 38	0 17 27	0 18 18	0 19 12	0 20 10	0 21 9	0 22 14	0 23 24	0 24 37	0 25 52	0 27 8	0 28 27	0 29 49	0 31 15	0 32 45
8	0 16 46	0 17 35	0 18 27	0 19 21	0 20 20	0 21 20	0 22 25	0 23 36	0 24 51	0 26 7	0 27 24	0 28 44	0 30 7	0 31 34	0 33 5
9	0 16 54	0 17 44	0 18 36	0 19 31	0 20 30	0 21 31	0 22 36	0 23 49	0 25 5	0 26 22	0 27 40	0 29 1	0 30 25	0 31 53	0 33 25
10	0 17 2	0 17 53	0 18 45	0 19 41	0 20 40	0 21 42	0 22 47	0 24 2	0 25 19	0 26 37	0 27 56	0 29 18	0 30 43	0 32 12	0 33 45
11	0 17 10	0 18 2	0 18 55	0 19 52	0 20 51	0 21 54	0 23 1	0 24 16	0 25 34	0 26 53	0 28 13	0 29 35	0 31 1	0 32 32	0 34 6
12	0 17 18	0 18 11	0 19 6	0 20 3	0 21 3	0 22 7	0 23 15	0 24 30	0 25 49	0 27 9	0 28 30	0 29 53	0 31 20	0 32 52	0 34 28
13	0 17 26	0 18 20	0 19 17	0 20 15	0 21 15	0 22 21	0 23 29	0 24 45	0 26 5	0 27 26	0 28 48	0 30 12	0 31 40	0 33 13	0 34 51
14	0 17 34	0 18 29	0 19 28	0 20 27	0 21 28	0 22 36	0 23 44	0 25 1	0 26 22	0 27 44	0 29 7	0 30 32	0 32 2	0 33 36	0 35 15
15	0 17 43	0 18 39	0 19 39	0 20 39	0 21 41	0 22 51	0 24 0	0 25 18	0 26 40	0 28 3	0 29 27	0 30 54	0 32 26	0 34 1	0 35 41
16	0 17 52	0 18 49	0 19 50	0 20 51	0 21 55	0 23 6	0 24 16	0 25 35	0 26 58	0 28 23	0 29 48	0 31 17	0 32 51	0 34 28	0 36 9
17	0 18 1	0 18 59	0 20 1	0 21 3	0 22 9	0 23 21	0 24 33	0 25 53	0 27 17	0 28 44	0 30 10	0 31 41	0 33 17	0 34 56	0 36 39
18	0 18 10	0 19 9	0 20 12	0 21 16	0 22 24	0 23 37	0 24 51	0 26 12	0 27 37	0 29 5	0 30 33	0 32 6	0 33 44	0 35 25	0 37 10
19	0 18 19	0 19 19	0 20 23	0 21 29	0 22 39	0 23 53	0 25 9	0 26 31	0 27 57	0 29 26	0 30 57	0 32 32	0 34 12	0 35 55	0 37 42
20	0 18 28	0 19 29	0 20 34	0 21 42	0 22 54	0 24 9	0 25 28	0 26 51	0 28 18	0 29 48	0 31 22	0 32 59	0 34 41	0 36 26	0 38 14
21	0 18 38	0 19 40	0 20 46	0 21 56	0 23 9	0 24 26	0 25 47	0 27 11	0 28 39	0 30 11	0 31 47	0 33 26	0 35 10	0 36 57	0 38 47
22	0 18 49	0 19 52	0 20 59	0 22 11	0 23 25	0 24 44	0 26 6	0 27 32	0 29 2	0 30 35	0 32 13	0 33 54	0 35 40	0 37 29	0 39 21
23	0 19 1	0 20 6	0 21 14	0 22 26	0 23 42	0 25 2	0 26 26	0 27 54	0 29 26	0 31 1	0 32 41	0 34 24	0 36 11	0 38 2	0 39 56

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 15 46	0 16 31	0 17 19	0 18 10	0 19 3	0 19 59	0 20 58	0 22 0	0 23 4	0 24 11	0 25 21	0 26 34	0 27 49	0 29 6	0 30 27
1	0 15 39	0 16 23	0 17 10	0 18 0	0 18 53	0 19 48	0 20 47	0 21 48	0 22 52	0 23 58	0 25 7	0 26 19	0 27 33	0 28 50	0 30 10
2	0 15 31	0 16 15	0 17 1	0 17 50	0 18 43	0 19 37	0 20 36	0 21 36	0 22 39	0 23 45	0 24 53	0 26 4	0 27 17	0 28 34	0 29 53
3	0 15 23	0 16 7	0 16 52	0 17 40	0 18 32	0 19 26	0 20 25	0 21 24	0 22 26	0 23 31	0 24 39	0 25 49	0 27 1	0 28 18	0 29 36
4	0 15 15	0 15 59	0 16 43	0 17 30	0 18 21	0 19 15	0 20 14	0 21 12	0 22 13	0 23 17	0 24 25	0 25 34	0 26 45	0 28 1	0 29 19
5	0 15 7	0 15 51	0 16 34	0 17 20	0 18 10	0 19 4	0 20 3	0 21 0	0 22 0	0 23 3	0 24 11	0 25 19	0 26 29	0 27 44	0 29 2
6	0 14 59	0 15 43	0 16 25	0 17 10	0 17 59	0 18 53	0 19 52	0 20 48	0 21 47	0 22 49	0 23 57	0 25 4	0 26 13	0 27 27	0 28 44
7	0 14 51	0 15 34	0 16 16	0 17 0	0 17 48	0 18 42	0 19 40	0 20 36	0 21 34	0 22 35	0 23 42	0 24 49	0 25 57	0 27 10	0 28 26
8	0 14 43	0 15 25	0 16 7	0 16 50	0 17 37	0 18 31	0 19 28	0 20 24	0 21 21	0 22 21	0 23 27	0 24 34	0 25 41	0 26 53	0 28 8
9	0 14 35	0 15 16	0 15 57	0 16 40	0 17 26	0 18 19	0 19 16	0 20 12	0 21 8	0 22 7	0 23 12	0 24 18	0 25 25	0 26 36	0 27 50
10	0 14 27	0 15 7	0 15 47	0 16 30	0 17 15	0 18 7	0 19 4	0 19 59	0 20 55	0 21 54	0 22 57	0 24 2	0 25 9	0 26 19	0 27 32
11	0 14 18	0 14 58	0 15 37	0 16 19	0 17 4	0 17 55	0 18 51	0 19 46	0 20 41	0 21 40	0 22 42	0 23 46	0 24 52	0 26 2	0 27 14
12	0 14 8	0 14 48	0 15 27	0 16 8	0 16 53	0 17 43	0 18 38	0 19 33	0 20 27	0 21 25	0 22 26	0 23 30	0 24 35	0 25 44	0 26 55
13	0 13 57	0 14 37	0 15 16	0 15 57	0 16 41	0 17 30	0 18 24	0 19 19	0 20 12	0 21 9	0 22 10	0 23 13	0 24 17	0 25 25	0 26 35
14	0 13 45	0 14 25	0 15 4	0 15 45	0 16 29	0 17 17	0 18 10	0 19 4	0 19 56	0 20 53	0 21 53	0 22 56	0 23 59	0 25 6	0 26 15
15	0 13 33	0 14 12	0 14 51	0 15 32	0 16 16	0 17 3	0 17 55	0 18 48	0 19 39	0 20 36	0 21 35	0 22 38	0 23 40	0 24 46	0 25 54
16	0 13 20	0 13 58	0 14 37	0 15 18	0 16 2	0 16 48	0 17 39	0 18 31	0 19 22	0 20 19	0 21 17	0 22 19	0 23 20	0 24 26	0 25 33
17	0 13 6	0 13 43	0 14 22	0 15 3	0 15 47	0 16 32	0 17 22	0 18 13	0 19 4	0 20 1	0 20 58	0 21 59	0 22 59	0 24 5	0 25 11
18	0 12 51	0 13 27	0 14 6	0 14 47	0 15 31	0 16 16	0 17 4	0 17 54	0 18 45	0 19 42	0 20 38	0 21 38	0 22 38	0 23 43	0 24 48
19	0 12 35	0 13 10	0 13 49	0 14 30	0 15 13	0 15 58	0 16 45	0 17 35	0 18 26	0 19 22	0 20 17	0 21 16	0 22 16	0 23 20	0 24 24
20	0 12 16	0 12 52	0 13 30	0 14 11	0 14 53	0 15 38	0 16 25	0 17 15	0 18 6	0 19 0	0 19 55	0 20 53	0 21 54	0 22 56	0 24 0
21	0 11 55	0 12 31	0 13 9	0 13 49	0 14 31	0 15 16	0 16 2	0 16 52	0 17 43	0 18 36	0 19 31	0 20 28	0 21 28	0 22 30	0 23 33
22	0 11 32	0 12 8	0 12 46	0 13 25	0 14 7	0 14 51	0 15 37	0 16 26	0 17 17	0 18 9	0 19 4	0 20 0	0 20 59	0 22 1	0 23 3
23	0 11 8	0 11 43	0 12 20	0 12 59	0 13 41	0 14 24	0 15 9	0 15 57	0 16 47	0 17 38	0 18 32	0 19 28	0 20 26	0 21 27	0 22 29

LATITUDE 55° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 31 50	0 33 16	0 34 45	0 36 16	0 37 50	0 39 27	0 41 6	0 42 48	0 44 33	0 46 20	0 48 10	0 50 3	0 51 58	0 53 56	0 55 56
1	0 32 10	0 33 37	0 35 7	0 36 39	0 38 14	0 39 52	0 41 32	0 43 15	0 45 0	0 46 48	0 48 39	0 50 33	0 52 29	0 54 28	0 56 29
2	0 32 30	0 33 58	0 35 29	0 37 2	0 38 38	0 40 17	0 41 58	0 43 42	0 45 28	0 47 17	0 49 9	0 51 4	0 53 1	0 55 1	0 57 4
3	0 32 50	0 34 19	0 35 51	0 37 25	0 39 2	0 40 42	0 42 24	0 44 9	0 45 57	0 47 47	0 49 40	0 51 36	0 53 34	0 55 36	0 57 40
4	0 33 11	0 34 41	0 36 14	0 37 49	0 39 27	0 41 8	0 42 51	0 44 37	0 46 26	0 48 18	0 50 12	0 52 9	0 54 8	0 56 12	0 58 18
5	0 33 32	0 35 3	0 36 37	0 38 13	0 39 52	0 41 34	0 43 19	0 45 6	0 46 56	0 48 50	0 50 45	0 52 43	0 54 44	0 56 50	0 58 58
6	0 33 53	0 35 25	0 37 0	0 38 37	0 40 17	0 42 0	0 43 47	0 45 35	0 47 28	0 49 24	0 51 20	0 53 19	0 55 21	0 57 29	0 59 39
7	0 34 14	0 35 47	0 37 23	0 39 2	0 40 43	0 42 27	0 44 16	0 46 5	0 48 1	0 49 59	0 51 56	0 53 56	0 56 0	0 58 10	1 0 22
8	0 34 36	0 36 10	0 37 47	0 39 27	0 41 10	0 42 56	0 44 46	0 46 38	0 48 35	0 50 35	0 52 34	0 54 35	0 56 41	0 58 53	1 1 7
9	0 34 58	0 36 33	0 38 11	0 39 53	0 41 38	0 43 26	0 45 18	0 47 12	0 49 10	0 51 12	0 53 13	0 55 16	0 57 24	0 59 38	1 1 54
10	0 35 20	0 36 56	0 38 36	0 40 20	0 42 7	0 43 57	0 45 50	0 47 47	0 49 46	0 51 49	0 53 53	0 55 58	0 58 8	1 0 24	1 2 42
11	0 35 42	0 37 20	0 39 3	0 40 49	0 42 38	0 44 30	0 46 25	0 48 23	0 50 24	0 52 27	0 54 33	0 56 41	0 58 53	1 1 10	1 3 30
12	0 36 6	0 37 46	0 39 32	0 41 20	0 43 11	0 45 5	0 47 2	0 49 1	0 51 3	0 53 6	0 55 14	0 57 25	0 59 39	1 1 57	1 4 19
13	0 36 32	0 38 14	0 40 3	0 41 53	0 43 46	0 45 42	0 47 41	0 49 41	0 51 43	0 53 46	0 55 56	0 58 10	1 0 26	1 2 45	1 5 9
14	0 36 59	0 38 43	0 40 35	0 42 27	0 44 22	0 46 20	0 48 21	0 50 22	0 52 25	0 54 28	0 56 39	0 58 56	1 1 14	1 3 35	1 6 1
15	0 37 27	0 39 13	0 41 8	0 43 2	0 44 59	0 46 59	0 49 2	0 51 4	0 53 8	0 55 11	0 57 24	0 59 44	1 2 4	1 4 27	1 6 55
16	0 37 56	0 39 44	0 41 42	0 43 38	0 45 37	0 47 39	0 49 44	0 51 47	0 53 51	0 55 56	0 58 11	1 0 34	1 2 56	1 5 21	1 7 51
17	0 38 27	0 40 17	0 42 16	0 44 14	0 46 15	0 48 19	0 50 26	0 52 31	0 54 35	0 56 42	0 58 59	1 1 25	1 3 49	1 6 16	1 8 48
18	0 38 59	0 40 51	0 42 51	0 44 51	0 46 54	0 49 0	0 51 8	0 53 15	0 55 21	0 57 30	0 59 49	1 2 18	1 4 45	1 7 14	1 9 48
19	0 39 32	0 41 26	0 43 26	0 45 28	0 47 33	0 49 41	0 51 50	0 54 0	0 56 8	0 58 19	1 0 40	1 3 12	1 5 42	1 8 13	1 10 49
20	0 40 6	0 42 2	0 44 2	0 46 5	0 48 12	0 50 22	0 52 33	0 54 45	0 56 57	0 59 10	1 1 32	1 4 7	1 6 40	1 9 13	1 11 52
21	0 40 40	0 42 37	0 44 38	0 46 42	0 48 51	0 51 3	0 53 16	0 55 31	0 57 48	1 0 7	1 2 29	1 5 5	1 7 40	1 10 17	1 12 59
22	0 41 16	0 43 14	0 45 15	0 47 20	0 49 31	0 51 44	0 54 0	0 56 18	0 58 40	1 1 6	1 3 32	1 6 8	1 8 46	1 11 27	1 14 12
23	0 41 53	0 43 52	0 45 54	0 48 0	0 50 11	0 52 26	0 54 45	0 57 7	0 59 34	1 2 6	1 4 41	1 7 18	1 9 59	1 12 45	1 15 32

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 31 50	0 33 16	0 34 45	0 36 16	0 37 50	0 39 27	0 41 6	0 42 48	0 44 33	0 46 20	0 48 10	0 50 3	0 51 58	0 53 56	0 55 56
1	0 31 32	0 32 57	0 34 25	0 35 55	0 37 28	0 39 4	0 40 42	0 42 23	0 44 7	0 45 53	0 47 41	0 49 33	0 51 27	0 53 24	0 55 22
2	0 31 14	0 32 38	0 34 5	0 35 34	0 37 6	0 38 41	0 40 18	0 41 58	0 43 41	0 45 26	0 47 12	0 49 3	0 50 56	0 52 52	0 54 48
3	0 30 56	0 32 19	0 33 45	0 35 13	0 36 44	0 38 18	0 39 54	0 41 33	0 43 15	0 44 58	0 46 43	0 48 33	0 50 25	0 52 19	0 54 14
4	0 30 38	0 32 0	0 33 25	0 34 52	0 36 22	0 37 55	0 39 30	0 41 8	0 42 48	0 44 30	0 46 14	0 48 3	0 49 53	0 51 46	0 53 40
5	0 30 20	0 31 41	0 33 5	0 34 31	0 35 59	0 37 31	0 39 5	0 40 42	0 42 21	0 44 2	0 45 45	0 47 33	0 49 21	0 51 13	0 53 6
6	0 30 2	0 31 22	0 32 44	0 34 9	0 35 36	0 37 7	0 38 40	0 40 16	0 41 54	0 43 34	0 45 16	0 47 2	0 48 49	0 50 40	0 52 32
7	0 29 43	0 31 2	0 32 23	0 33 47	0 35 13	0 36 43	0 38 15	0 39 50	0 41 27	0 43 6	0 44 47	0 46 31	0 48 17	0 50 7	0 51 58
8	0 29 24	0 30 42	0 32 2	0 33 25	0 34 50	0 36 19	0 37 50	0 39 24	0 41 0	0 42 38	0 44 18	0 46 0	0 47 45	0 49 34	0 51 24
9	0 29 5	0 30 22	0 31 41	0 33 3	0 34 27	0 35 55	0 37 25	0 38 58	0 40 33	0 42 10	0 43 49	0 45 29	0 47 13	0 49 1	0 50 50
10	0 28 46	0 30 2	0 31 20	0 32 41	0 34 4	0 35 31	0 37 0	0 38 32	0 40 6	0 41 42	0 43 19	0 44 58	0 46 41	0 48 28	0 50 16
11	0 28 27	0 29 42	0 30 59	0 32 19	0 33 41	0 35 7	0 36 35	0 38 6	0 39 39	0 41 14	0 42 49	0 44 27	0 46 9	0 47 55	0 49 42
12	0 28 7	0 29 22	0 30 38	0 31 57	0 33 18	0 34 43	0 36 10	0 37 40	0 39 12	0 40 46	0 42 19	0 43 56	0 45 37	0 47 22	0 49 8
13	0 27 46	0 29 1	0 30 16	0 31 34	0 32 54	0 34 18	0 35 45	0 37 14	0 38 45	0 40 18	0 41 49	0 43 25	0 45 5	0 46 49	0 48 34
14	0 27 25	0 28 39	0 29 54	0 31 11	0 32 30	0 33 53	0 35 19	0 36 47	0 38 17	0 39 49	0 41 19	0 42 54	0 44 33	0 46 16	0 48 0
15	0 27 3	0 28 17	0 29 31	0 30 47	0 32 6	0 33 28	0 34 53	0 36 20	0 37 49	0 39 20	0 40 49	0 42 23	0 44 1	0 45 43	0 47 25
16	0 26 41	0 27 54	0 29 7	0 30 23	0 31 41	0 33 3	0 34 27	0 35 53	0 37 21	0 38 51	0 40 19	0 41 52	0 43 29	0 45 9	0 46 50
17	0 26 18	0 27 31	0 28 43	0 29 58	0 31 16	0 32 37	0 34 0	0 35 25	0 36 52	0 38 21	0 39 49	0 41 21	0 42 56	0 44 35	0 46 15
18	0 25 55	0 27 7	0 28 18	0 29 33	0 30 50	0 32 10	0 33 32	0 34 56	0 36 22	0 37 50	0 39 18	0 40 50	0 42 23	0 44 1	0 45 40
19	0 25 31	0 26 42	0 27 53	0 29 7	0 30 24	0 31 42	0 33 3	0 34 26	0 35 51	0 37 18	0 38 46	0 40 18	0 41 50	0 43 26	0 45 4
20	0 25 7	0 26 16	0 27 27	0 28 40	0 29 56	0 31 13	0 32 33	0 33 55	0 35 19	0 36 45	0 38 13	0 39 44	0 41 16	0 42 51	0 44 28
21	0 24 40	0 25 48	0 26 58	0 28 10	0 29 25	0 30 42	0 32 1	0 33 22	0 34 45	0 36 10	0 37 38	0 39 7	0 40 39	0 42 13	0 43 49
22	0 24 9	0 25 16	0 26 26	0 27 37	0 28 51	0 30 7	0 31 25	0 32 45	0 34 7	0 35 31	0 36 58	0 38 26	0 39 57	0 41 30	0 43 5
23	0 23 33	0 24 40	0 25 49	0 26 59	0 28 12	0 29 27	0 30 44	0 32 3	0 33 24	0 34 47	0 36 13	0 37 40	0 39 10	0 40 41	0 42 15

LATITUDE 55° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 57 59	1 0 5	1 2 14	1 4 25	1 6 38	1 8 54	1 11 13	1 13 34	1 15 58	1 18 25	1 20 54	1 23 25	1 25 59	1 28 36	1 31 15
1	0 58 33	1 0 40	1 2 50	1 5 2	1 7 17	1 9 35	1 11 56	1 14 19	1 16 45	1 19 14	1 21 45	1 24 18	1 26 54	1 29 33	1 32 15
2	0 59 9	1 1 17	1 3 28	1 5 42	1 7 58	1 10 18	1 12 41	1 15 6	1 17 34	1 20 5	1 22 38	1 25 13	1 27 51	1 30 32	1 33 16
3	0 59 46	1 1 55	1 4 7	1 6 23	1 8 41	1 11 3	1 13 28	1 15 55	1 18 25	1 20 58	1 23 33	1 26 10	1 28 50	1 31 33	1 34 19
4	1 0 25	1 2 36	1 4 49	1 7 6	1 9 26	1 11 50	1 14 17	1 16 46	1 19 18	1 21 53	1 24 30	1 27 9	1 29 51	1 32 36	1 35 24
5	1 1 7	1 3 19	1 5 34	1 7 53	1 10 13	1 12 39	1 15 8	1 17 39	1 20 13	1 22 50	1 25 29	1 28 10	1 30 54	1 33 41	1 36 31
6	1 1 50	1 4 4	1 6 21	1 8 42	1 11 4	1 13 31	1 16 1	1 18 34	1 21 10	1 23 49	1 26 30	1 29 14	1 32 0	1 34 48	1 37 40
7	1 2 35	1 4 51	1 7 10	1 9 33	1 11 57	1 14 26	1 16 57	1 19 31	1 22 9	1 24 50	1 27 34	1 30 20	1 33 8	1 35 58	1 38 51
8	1 3 22	1 5 40	1 8 1	1 10 26	1 12 52	1 15 23	1 17 56	1 20 32	1 23 11	1 25 53	1 28 40	1 31 28	1 34 18	1 37 10	1 40 4
9	1 4 11	1 6 31	1 8 54	1 11 21	1 13 49	1 16 22	1 18 57	1 21 35	1 24 15	1 26 59	1 29 48	1 32 38	1 35 30	1 38 24	1 41 20
10	1 5 1	1 7 23	1 9 49	1 12 17	1 14 49	1 17 24	1 20 1	1 22 41	1 25 23	1 28 9	1 30 58	1 33 50	1 36 44	1 39 40	1 42 40
11	1 5 52	1 8 16	1 10 45	1 13 15	1 15 49	1 18 27	1 21 7	1 23 49	1 26 34	1 29 22	1 32 12	1 35 6	1 38 2	1 41 1	1 44 3
12	1 6 44	1 9 10	1 11 42	1 14 14	1 16 50	1 19 31	1 22 14	1 24 59	1 27 46	1 30 37	1 33 29	1 36 25	1 39 23	1 42 25	1 45 29
13	1 7 37	1 10 5	1 12 40	1 15 14	1 17 52	1 20 36	1 23 22	1 26 10	1 29 0	1 31 54	1 34 48	1 37 46	1 40 46	1 43 51	1 46 58
14	1 8 32	1 11 2	1 13 39	1 16 15	1 18 56	1 21 43	1 24 32	1 27 22	1 30 15	1 33 12	1 36 9	1 39 9	1 42 11	1 45 19	1 48 29
15	1 9 28	1 12 0	1 14 39	1 17 18	1 20 1	1 22 51	1 25 43	1 28 36	1 31 31	1 34 31	1 37 31	1 40 34	1 43 39	1 46 49	1 50 2
16	1 10 26	1 13 0	1 15 41	1 18 23	1 21 8	1 24 1	1 26 55	1 29 51	1 32 48	1 35 51	1 38 55	1 42 1	1 45 9	1 48 22	1 51 37
17	1 11 25	1 14 2	1 16 45	1 19 30	1 22 17	1 25 12	1 28 9	1 31 8	1 34 7	1 37 13	1 40 20	1 43 29	1 46 40	1 49 56	1 53 14
18	1 12 27	1 15 7	1 17 52	1 20 39	1 23 28	1 26 25	1 29 25	1 32 26	1 35 27	1 38 36	1 41 48	1 44 58	1 48 12	1 51 31	1 54 52
19	1 13 30	1 16 13	1 19 0	1 21 49	1 24 41	1 27 40	1 30 43	1 33 46	1 36 50	1 40 1	1 43 16	1 46 29	1 49 46	1 53 8	1 56 33
20	1 14 35	1 17 21	1 20 10	1 23 1	1 25 56	1 28 57	1 32 3	1 35 9	1 38 16	1 41 30	1 44 45	1 48 3	1 51 23	1 54 48	1 58 17
21	1 15 44	1 18 33	1 21 25	1 24 20	1 27 18	1 30 21	1 33 29	1 36 38	1 39 49	1 43 6	1 46 24	1 49 45	1 53 9	1 56 37	2 0 9
22	1 16 59	1 19 51	1 22 47	1 25 46	1 28 47	1 31 53	1 35 2	1 38 14	1 41 30	1 44 50	1 48 12	1 51 36	1 55 4	1 58 36	2 2 11
23	1 18 21	1 21 16	1 24 16	1 27 19	1 30 25	1 33 34	1 36 45	1 40 0	1 43 20	1 46 43	1 50 9	1 53 37	1 57 9	2 0 45	2 4 24

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 57 59	1 0 5	1 2 14	1 4 25	1 6 38	1 8 54	1 11 13	1 13 34	1 15 58	1 18 25	1 20 54	1 23 25	1 25 59	1 28 36	1 31 15
1	0 57 23	0 59 26	1 1 33	1 3 44	1 5 57	1 8 11	1 10 29	1 12 48	1 15 11	1 17 36	1 20 4	1 22 33	1 25 5	1 27 40	1 30 17
2	0 56 47	0 58 47	1 0 52	1 3 3	1 5 16	1 7 28	1 9 45	1 12 2	1 14 24	1 16 47	1 19 14	1 21 41	1 24 11	1 26 44	1 29 19
3	0 56 11	0 58 9	1 0 12	1 2 22	1 4 35	1 6 45	1 9 1	1 11 17	1 13 37	1 15 58	1 18 24	1 20 49	1 23 17	1 25 48	1 28 21
4	0 55 35	0 57 32	0 59 33	1 1 42	1 3 54	1 6 3	1 8 17	1 10 32	1 12 50	1 15 9	1 17 34	1 19 57	1 22 24	1 24 52	1 27 23
5	0 55 0	0 56 55	0 58 54	1 1 2	1 3 13	1 5 21	1 7 33	1 9 47	1 12 3	1 14 21	1 16 44	1 19 6	1 21 31	1 23 56	1 26 26
6	0 54 25	0 56 18	0 58 15	1 0 22	1 2 32	1 4 39	1 6 49	1 9 2	1 11 16	1 13 33	1 15 54	1 18 15	1 20 38	1 23 0	1 25 29
7	0 53 50	0 55 42	0 57 37	0 59 43	1 1 51	1 3 57	1 6 5	1 8 17	1 10 29	1 12 45	1 15 4	1 17 24	1 19 45	1 22 5	1 24 33
8	0 53 15	0 55 6	0 56 59	0 59 4	1 1 10	1 3 15	1 5 22	1 7 32	1 9 42	1 11 57	1 14 14	1 16 33	1 18 52	1 21 11	1 23 37
9	0 52 40	0 54 31	0 56 22	0 58 26	1 0 29	1 2 33	1 4 39	1 6 47	1 8 56	1 11 9	1 13 25	1 15 42	1 17 59	1 20 18	1 22 44
10	0 52 5	0 53 57	0 55 52	0 57 49	0 59 49	1 1 51	1 3 56	1 6 2	1 8 10	1 10 21	1 12 36	1 14 51	1 17 6	1 19 26	1 21 52
11	0 51 30	0 53 23	0 55 16	0 57 12	0 59 9	1 1 10	1 3 14	1 5 18	1 7 25	1 9 35	1 11 49	1 14 2	1 16 15	1 18 35	1 20 59
12	0 50 55	0 52 48	0 54 40	0 56 35	0 58 29	1 0 29	1 2 31	1 4 34	1 6 40	1 8 49	1 11 2	1 13 13	1 15 25	1 17 43	1 20 6
13	0 50 20	0 52 12	0 54 3	0 55 57	0 57 49	0 59 48	1 1 48	1 3 50	1 5 55	1 8 3	1 10 15	1 12 24	1 14 35	1 16 52	1 19 13
14	0 49 45	0 51 36	0 53 26	0 55 19	0 57 9	0 59 7	1 1 5	1 3 6	1 5 10	1 7 17	1 9 27	1 11 35	1 13 45	1 16 1	1 18 20
15	0 49 9	0 50 59	0 52 48	0 54 40	0 56 29	0 58 25	1 0 22	1 2 22	1 4 25	1 6 31	1 8 39	1 10 46	1 12 55	1 15 10	1 17 27
16	0 48 33	0 50 22	0 52 10	0 54 1	0 55 49	0 57 43	0 59 39	1 1 38	1 3 40	1 5 45	1 7 51	1 9 57	1 12 5	1 14 18	1 16 34
17	0 47 57	0 49 45	0 51 32	0 53 22	0 55 8	0 57 1	0 58 56	1 0 54	1 2 55	1 4 58	1 7 3	1 9 8	1 11 15	1 13 26	1 15 41
18	0 47 21	0 49 7	0 50 53	0 52 42	0 54 27	0 56 19	0 58 13	1 0 10	1 2 10	1 4 11	1 6 15	1 8 19	1 10 25	1 12 34	1 14 48
19	0 46 44	0 48 28	0 50 13	0 52 1	0 53 46	0 55 37	0 57 30	0 59 26	1 1 24	1 3 24	1 5 26	1 7 29	1 9 35	1 11 42	1 13 54
20	0 46 7	0 47 49	0 49 32	0 51 18	0 53 5	0 54 55	0 56 47	0 58 41	1 0 38	1 2 36	1 4 37	1 6 39	1 8 44	1 10 51	1 13 0
21	0 45 27	0 47 7	0 48 49	0 50 33	0 52 20	0 54 9	0 56 0	0 57 53	0 59 48	1 1 45	1 3 45	1 5 46	1 7 49	1 9 54	1 12 2
22	0 44 42	0 46 21	0 48 2	0 49 45	0 51 31	0 53 18	0 55 8	0 57 0	0 58 54	1 0 54	1 2 47	1 4 47	1 6 49	1 8 52	1 10 58
23	0 43 51	0 45 29	0 47 9	0 48 51	0 50 35	0 52 21	0 54 9	0 55 59	0 57 52	0 59 46	1 1 42	1 3 41	1 5 42	1 7 44	1 9 49

LATITUDE 56° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 9 59	0 10 4	0 10 10	0 10 19	0 10 31	0 10 46	0 11 0	0 11 23	0 11 45	0 12 10	0 12 38	0 13 8	0 13 41	0 14 18	0 14 56
1	0 10 2	0 10 7	0 10 13	0 10 22	0 10 34	0 10 50	0 11 4	0 11 27	0 11 49	0 12 14	0 12 42	0 13 13	0 13 46	0 14 23	0 15 2
2	0 10 5	0 10 10	0 10 16	0 10 25	0 10 37	0 10 54	0 11 8	0 11 31	0 11 53	0 12 18	0 12 46	0 13 18	0 13 51	0 14 28	0 15 8
3	0 10 8	0 10 13	0 10 19	0 10 28	0 10 40	0 10 58	0 11 12	0 11 35	0 11 57	0 12 22	0 12 50	0 13 23	0 13 56	0 14 34	0 15 14
4	0 10 11	0 10 16	0 10 22	0 10 31	0 10 43	0 11 1	0 11 16	0 11 39	0 12 1	0 12 26	0 12 54	0 13 28	0 14 1	0 14 40	0 15 20
5	0 10 13	0 10 18	0 10 25	0 10 34	0 10 46	0 11 4	0 11 20	0 11 43	0 12 5	0 12 30	0 12 58	0 13 33	0 14 6	0 14 46	0 15 26
6	0 10 15	0 10 20	0 10 28	0 10 37	0 10 49	0 11 7	0 11 24	0 11 47	0 12 9	0 12 34	0 13 3	0 13 38	0 14 11	0 14 52	0 15 33
7	0 10 17	0 10 22	0 10 31	0 10 39	0 10 52	0 11 10	0 11 28	0 11 51	0 12 13	0 12 38	0 13 8	0 13 43	0 14 17	0 14 58	0 15 40
8	0 10 19	0 10 24	0 10 33	0 10 41	0 10 55	0 11 13	0 11 32	0 11 54	0 12 17	0 12 42	0 13 13	0 13 48	0 14 23	0 15 4	0 15 47
9	0 10 21	0 10 26	0 10 35	0 10 43	0 10 58	0 11 16	0 11 36	0 11 57	0 12 21	0 12 47	0 13 18	0 13 53	0 14 29	0 15 10	0 15 54
10	0 10 23	0 10 28	0 10 37	0 10 45	0 11 0	0 11 19	0 11 39	0 12 0	0 12 24	0 12 52	0 13 23	0 13 58	0 14 35	0 15 16	0 16 1
11	0 10 25	0 10 30	0 10 39	0 10 48	0 11 3	0 11 22	0 11 42	0 12 4	0 12 27	0 12 57	0 13 28	0 14 3	0 14 41	0 15 22	0 16 8
12	0 10 27	0 10 32	0 10 41	0 10 51	0 11 6	0 11 25	0 11 45	0 12 8	0 12 30	0 13 2	0 13 33	0 14 8	0 14 47	0 15 28	0 16 15
13	0 10 29	0 10 34	0 10 43	0 10 54	0 11 9	0 11 28	0 11 48	0 12 11	0 12 34	0 13 7	0 13 38	0 14 13	0 14 53	0 15 34	0 16 22
14	0 10 31	0 10 36	0 10 45	0 10 57	0 11 12	0 11 31	0 11 51	0 12 14	0 12 38	0 13 12	0 13 43	0 14 18	0 14 59	0 15 40	0 16 29
15	0 10 33	0 10 38	0 10 47	0 10 59	0 11 14	0 11 34	0 11 54	0 12 17	0 12 42	0 13 16	0 13 48	0 14 23	0 15 5	0 15 47	0 16 36
16	0 10 35	0 10 40	0 10 49	0 11 1	0 11 16	0 11 36	0 11 57	0 12 20	0 12 46	0 13 20	0 13 53	0 14 29	0 15 11	0 15 54	0 16 43
17	0 10 37	0 10 42	0 10 51	0 11 3	0 11 18	0 11 38	0 12 0	0 12 23	0 12 50	0 13 24	0 13 58	0 14 35	0 15 17	0 16 1	0 16 50
18	0 10 39	0 10 44	0 10 53	0 11 5	0 11 20	0 11 40	0 12 2	0 12 26	0 12 54	0 13 28	0 14 3	0 14 41	0 15 23	0 16 8	0 16 57
19	0 10 41	0 10 45	0 10 55	0 11 7	0 11 22	0 11 42	0 12 4	0 12 29	0 12 58	0 13 32	0 14 8	0 14 47	0 15 29	0 16 15	0 17 4
20	0 10 42	0 10 46	0 10 56	0 11 8	0 11 24	0 11 44	0 12 6	0 12 32	0 13 2	0 13 36	0 14 13	0 14 53	0 15 36	0 16 22	0 17 11
21	0 10 44	0 10 47	0 10 58	0 11 11	0 11 26	0 11 46	0 12 9	0 12 35	0 13 6	0 13 40	0 14 18	0 14 59	0 15 43	0 16 30	0 17 20
22	0 10 46	0 10 48	0 11 0	0 11 12	0 11 28	0 11 48	0 12 12	0 12 39	0 13 10	0 13 44	0 14 23	0 15 5	0 15 50	0 16 38	0 17 30
23	0 10 47	0 10 50	0 11 2	0 11 13	0 11 31	0 11 49	0 12 14	0 12 43	0 13 15	0 13 49	0 14 28	0 15 11	0 15 57	0 16 46	0 17 41

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 9 59	0 10 4	0 10 10	0 10 19	0 10 31	0 10 46	0 11 0	0 11 23	0 11 45	0 12 10	0 12 38	0 13 8	0 13 41	0 14 18	0 14 56
1	0 9 55	0 10 0	0 10 6	0 10 15	0 10 27	0 10 42	0 10 56	0 11 18	0 11 40	0 12 5	0 12 33	0 13 2	0 13 35	0 14 11	0 14 49
2	0 9 51	0 9 56	0 10 2	0 10 11	0 10 23	0 10 38	0 10 52	0 11 13	0 11 35	0 12 0	0 12 27	0 12 56	0 13 29	0 14 4	0 14 42
3	0 9 47	0 9 52	0 9 58	0 10 7	0 10 19	0 10 34	0 10 48	0 11 8	0 11 30	0 11 55	0 12 21	0 12 50	0 13 23	0 13 57	0 14 35
4	0 9 42	0 9 47	0 9 53	0 10 2	0 10 14	0 10 29	0 10 44	0 11 3	0 11 25	0 11 49	0 12 15	0 12 44	0 13 16	0 13 50	0 14 27
5	0 9 37	0 9 42	0 9 48	0 9 57	0 10 9	0 10 24	0 10 39	0 10 58	0 11 19	0 11 43	0 12 9	0 12 37	0 13 9	0 13 43	0 14 19
6	0 9 32	0 9 37	0 9 43	0 9 52	0 10 4	0 10 19	0 10 34	0 10 53	0 11 13	0 11 37	0 12 3	0 12 30	0 13 2	0 13 35	0 14 11
7	0 9 27	0 9 32	0 9 38	0 9 47	0 9 59	0 10 14	0 10 29	0 10 47	0 11 7	0 11 31	0 11 56	0 12 23	0 12 55	0 13 27	0 14 3
8	0 9 22	0 9 27	0 9 33	0 9 42	0 9 53	0 10 8	0 10 23	0 10 41	0 11 1	0 11 24	0 11 49	0 12 16	0 12 47	0 13 19	0 13 55
9	0 9 17	0 9 22	0 9 28	0 9 36	0 9 47	0 10 2	0 10 17	0 10 35	0 10 55	0 11 17	0 11 42	0 12 9	0 12 39	0 13 11	0 13 46
10	0 9 12	0 9 17	0 9 23	0 9 30	0 9 41	0 9 56	0 10 11	0 10 28	0 10 48	0 11 10	0 11 35	0 12 2	0 12 31	0 13 3	0 13 37
11	0 9 6	0 9 11	0 9 17	0 9 24	0 9 35	0 9 50	0 10 5	0 10 21	0 10 40	0 11 2	0 11 27	0 11 54	0 12 22	0 12 54	0 13 27
12	0 8 59	0 9 4	0 9 10	0 9 17	0 9 28	0 9 43	0 9 58	0 10 13	0 10 32	0 10 54	0 11 18	0 11 45	0 12 12	0 12 44	0 13 16
13	0 8 51	0 8 56	0 9 2	0 9 9	0 9 20	0 9 35	0 9 50	0 10 4	0 10 23	0 10 45	0 11 8	0 11 35	0 12 2	0 12 34	0 13 4
14	0 8 42	0 8 47	0 8 53	0 9 0	0 9 11	0 9 26	0 9 40	0 9 54	0 10 13	0 10 35	0 10 57	0 11 24	0 11 51	0 12 23	0 12 51
15	0 8 32	0 8 37	0 8 43	0 8 50	0 9 1	0 9 15	0 9 29	0 9 43	0 10 2	0 10 24	0 10 46	0 11 12	0 11 39	0 12 11	0 12 37
16	0 8 22	0 8 26	0 8 32	0 8 39	0 8 50	0 9 4	0 9 17	0 9 31	0 9 50	0 10 12	0 10 34	0 10 59	0 11 26	0 11 58	0 12 23
17	0 8 10	0 8 14	0 8 20	0 8 27	0 8 38	0 8 51	0 9 4	0 9 18	0 9 47	0 9 59	0 10 21	0 10 45	0 11 12	0 11 44	0 12 8
18	0 7 57	0 8 1	0 8 7	0 8 14	0 8 25	0 8 38	0 8 51	0 9 5	0 9 33	0 9 45	0 10 7	0 10 30	0 10 57	0 11 29	0 11 52
19	0 7 43	0 7 47	0 7 53	0 8 0	0 8 10	0 8 23	0 8 36	0 8 50	0 9 18	0 9 30	0 9 51	0 10 13	0 10 40	0 11 12	0 11 35
20	0 7 28	0 7 31	0 7 37	0 7 44	0 7 53	0 8 6	0 8 19	0 8 33	0 8 51	0 9 13	0 9 34	0 9 55	0 10 22	0 10 54	0 11 17
21	0 7 11	0 7 13	0 7 19	0 7 26	0 7 34	0 7 46	0 8 0	0 8 14	0 8 32	0 8 54	0 9 15	0 9 37	0 10 3	0 10 34	0 10 58
22	0 6 49	0 6 42	0 6 58	0 7 5	0 7 12	0 7 24	0 7 37	0 7 53	0 8 11	0 8 31	0 8 52	0 9 16	0 9 41	0 10 10	0 10 37
23	0 6 22	0 6 25	0 6 31	0 6 37	0 6 46	0 6 57	0 7 10	0 7 27	0 7 44	0 8 4	0 8 25	0 8 49	0 9 15	0 9 42	0 10 12

LATITUDE 56° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 15 37	0 16 20	0 17 7	0 17 55	0 18 47	0 19 41	0 20 38	0 21 37	0 22 39	0 23 44	0 24 51	0 26 1	0 27 13	0 28 28	0 29 46
1	0 15 45	0 16 28	0 17 15	0 18 3	0 18 56	0 19 51	0 20 49	0 21 48	0 22 50	0 23 56	0 25 4	0 26 14	0 27 28	0 28 44	0 30 3
2	0 15 53	0 16 36	0 17 23	0 18 12	0 19 5	0 20 1	0 21 0	0 21 59	0 23 1	0 24 8	0 25 17	0 26 29	0 27 43	0 29 0	0 30 20
3	0 16 1	0 16 44	0 17 31	0 18 21	0 19 14	0 20 11	0 21 11	0 22 10	0 23 13	0 24 20	0 25 30	0 26 43	0 27 58	0 29 16	0 30 37
4	0 16 8	0 16 52	0 17 39	0 18 30	0 19 23	0 20 21	0 21 22	0 22 22	0 23 25	0 24 32	0 25 44	0 26 57	0 28 13	0 29 33	0 30 55
5	0 16 15	0 17 0	0 17 47	0 18 39	0 19 33	0 20 31	0 21 33	0 22 34	0 23 38	0 24 45	0 25 58	0 27 12	0 28 29	0 29 50	0 31 13
6	0 16 22	0 17 8	0 17 55	0 18 48	0 19 43	0 20 41	0 21 43	0 22 46	0 23 51	0 24 58	0 26 13	0 27 27	0 28 45	0 30 7	0 31 31
7	0 16 29	0 17 16	0 18 3	0 18 57	0 19 53	0 20 52	0 21 55	0 22 58	0 24 4	0 25 12	0 26 28	0 27 43	0 29 2	0 30 25	0 31 50
8	0 16 36	0 17 24	0 18 12	0 19 6	0 20 3	0 21 3	0 22 6	0 23 11	0 24 17	0 25 27	0 26 43	0 27 59	0 29 20	0 30 43	0 32 9
9	0 16 43	0 17 32	0 18 21	0 19 15	0 20 13	0 21 14	0 22 18	0 23 24	0 24 31	0 25 42	0 26 58	0 28 16	0 29 38	0 31 2	0 32 29
10	0 16 50	0 17 40	0 18 30	0 19 24	0 20 23	0 21 25	0 22 30	0 23 37	0 24 45	0 25 57	0 27 13	0 28 33	0 29 56	0 31 21	0 32 49
11	0 16 57	0 17 48	0 18 39	0 19 34	0 20 34	0 21 37	0 22 43	0 23 51	0 25 0	0 26 13	0 27 30	0 28 51	0 30 15	0 31 41	0 33 10
12	0 17 4	0 17 56	0 18 48	0 19 44	0 20 45	0 21 49	0 22 56	0 24 6	0 25 15	0 26 29	0 27 47	0 29 9	0 30 34	0 32 1	0 33 32
13	0 17 11	0 18 4	0 18 57	0 19 55	0 20 56	0 22 1	0 23 9	0 24 21	0 25 31	0 26 46	0 28 5	0 29 28	0 30 54	0 32 22	0 33 55
14	0 17 18	0 18 12	0 19 6	0 20 6	0 21 7	0 22 13	0 23 22	0 24 36	0 25 47	0 27 3	0 28 23	0 29 47	0 31 14	0 32 44	0 34 18
15	0 17 25	0 18 20	0 19 16	0 20 17	0 21 18	0 22 25	0 23 36	0 24 51	0 26 3	0 27 21	0 28 42	0 30 7	0 31 35	0 33 6	0 34 42
16	0 17 32	0 18 28	0 19 26	0 20 28	0 21 30	0 22 38	0 23 50	0 25 6	0 26 20	0 27 39	0 29 1	0 30 27	0 31 56	0 33 28	0 35 6
17	0 17 40	0 18 36	0 19 36	0 20 39	0 21 42	0 22 51	0 24 4	0 25 21	0 26 37	0 27 58	0 29 21	0 30 48	0 32 17	0 33 51	0 35 31
18	0 17 48	0 18 44	0 19 46	0 20 50	0 21 54	0 23 4	0 24 18	0 25 36	0 26 54	0 28 17	0 29 41	0 31 9	0 32 39	0 34 14	0 35 56
19	0 17 56	0 18 53	0 19 56	0 21 1	0 22 6	0 23 17	0 24 32	0 25 51	0 27 12	0 28 36	0 30 1	0 31 30	0 33 1	0 34 38	0 36 22
20	0 18 4	0 19 2	0 20 6	0 21 12	0 22 19	0 23 30	0 24 46	0 26 6	0 27 30	0 28 55	0 30 21	0 31 51	0 33 24	0 35 3	0 36 48
21	0 18 14	0 19 13	0 20 17	0 21 24	0 22 33	0 23 46	0 25 3	0 26 24	0 27 48	0 29 14	0 30 41	0 32 13	0 33 49	0 35 30	0 37 16
22	0 18 24	0 19 26	0 20 30	0 21 38	0 22 49	0 24 4	0 25 23	0 26 45	0 28 9	0 29 35	0 31 3	0 32 38	0 34 17	0 36 0	0 37 47
23	0 18 39	0 19 40	0 20 44	0 21 53	0 23 6	0 24 24	0 25 47	0 27 10	0 28 34	0 30 0	0 31 29	0 33 6	0 34 49	0 36 35	0 38 23

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 15 37	0 16 20	0 17 7	0 17 55	0 18 47	0 19 41	0 20 38	0 21 37	0 22 39	0 23 44	0 24 51	0 26 1	0 27 13	0 28 28	0 29 46
1	0 15 30	0 16 12	0 16 59	0 17 46	0 18 38	0 19 31	0 20 27	0 21 25	0 22 27	0 23 31	0 24 37	0 25 47	0 26 58	0 28 12	0 29 29
2	0 15 23	0 16 4	0 16 51	0 17 37	0 18 29	0 19 21	0 20 16	0 21 13	0 22 15	0 23 18	0 24 23	0 25 32	0 26 43	0 27 56	0 29 12
3	0 15 16	0 15 56	0 16 42	0 17 28	0 18 19	0 19 11	0 20 5	0 21 1	0 22 2	0 23 5	0 24 9	0 25 17	0 26 28	0 27 40	0 28 55
4	0 15 7	0 15 48	0 16 33	0 17 18	0 18 9	0 19 0	0 19 54	0 20 49	0 21 49	0 22 52	0 23 55	0 25 2	0 26 13	0 27 24	0 28 38
5	0 14 59	0 15 40	0 16 24	0 17 8	0 17 59	0 18 49	0 19 43	0 20 37	0 21 36	0 22 38	0 23 41	0 24 47	0 25 57	0 27 7	0 28 21
6	0 14 51	0 15 31	0 16 15	0 16 58	0 17 49	0 18 38	0 19 32	0 20 25	0 21 23	0 22 24	0 23 27	0 24 32	0 25 41	0 26 52	0 28 4
7	0 14 42	0 15 22	0 16 5	0 16 48	0 17 38	0 18 27	0 19 21	0 20 13	0 21 10	0 22 10	0 23 13	0 24 17	0 25 25	0 26 35	0 27 47
8	0 14 33	0 15 13	0 15 55	0 16 38	0 17 27	0 18 16	0 19 9	0 20 1	0 20 57	0 21 56	0 22 59	0 24 2	0 25 9	0 26 18	0 27 30
9	0 14 24	0 15 4	0 15 45	0 16 28	0 17 16	0 18 5	0 18 57	0 19 49	0 20 44	0 21 42	0 22 44	0 23 47	0 24 53	0 26 1	0 27 12
10	0 14 15	0 14 54	0 15 35	0 16 18	0 17 5	0 17 54	0 18 45	0 19 37	0 20 31	0 21 28	0 22 29	0 23 32	0 24 37	0 25 44	0 26 54
11	0 14 5	0 14 44	0 15 25	0 16 8	0 16 54	0 17 42	0 18 32	0 19 24	0 20 17	0 21 14	0 22 14	0 23 16	0 24 21	0 25 27	0 26 36
12	0 13 54	0 14 33	0 15 14	0 15 57	0 16 42	0 17 29	0 18 18	0 19 10	0 20 2	0 20 59	0 21 58	0 22 59	0 24 4	0 25 9	0 26 17
13	0 13 42	0 14 21	0 15 2	0 15 45	0 16 29	0 17 15	0 18 3	0 18 55	0 19 46	0 20 43	0 21 41	0 22 41	0 23 46	0 24 50	0 25 57
14	0 13 29	0 14 8	0 14 49	0 15 32	0 16 15	0 17 0	0 17 47	0 18 39	0 19 30	0 20 26	0 21 23	0 22 23	0 23 27	0 24 30	0 25 37
15	0 13 15	0 13 54	0 14 35	0 15 18	0 16 0	0 16 44	0 17 31	0 18 23	0 19 13	0 20 8	0 21 4	0 22 4	0 23 7	0 24 10	0 25 16
16	0 12 59	0 13 38	0 14 19	0 15 2	0 15 44	0 16 18	0 17 15	0 18 6	0 18 56	0 19 50	0 20 45	0 21 45	0 22 47	0 23 49	0 24 55
17	0 12 42	0 13 21	0 14 3	0 14 45	0 15 28	0 16 11	0 16 58	0 17 48	0 18 38	0 19 31	0 20 26	0 21 25	0 22 26	0 23 28	0 24 33
18	0 12 24	0 13 4	0 13 46	0 14 28	0 15 11	0 15 54	0 16 40	0 17 29	0 18 19	0 19 11	0 20 6	0 21 5	0 22 4	0 23 6	0 24 10
19	0 12 6	0 12 46	0 13 28	0 14 10	0 14 53	0 15 37	0 16 21	0 17 9	0 17 59	0 18 51	0 19 46	0 20 44	0 21 42	0 22 43	0 23 46
20	0 11 47	0 12 28	0 13 10	0 13 52	0 14 34	0 15 17	0 16 1	0 16 48	0 17 38	0 18 30	0 19 25	0 20 21	0 21 19	0 22 19	0 23 21
21	0 11 27	0 12 9	0 12 49	0 13 30	0 14 12	0 14 56	0 15 40	0 16 26	0 17 15	0 18 6	0 19 0	0 19 56	0 20 54	0 21 53	0 22 55
22	0 11 6	0 11 46	0 12 24	0 13 4	0 13 46	0 14 30	0 15 15	0 16 0	0 16 48	0 17 38	0 18 31	0 19 27	0 20 24	0 21 23	0 22 24
23	0 10 45	0 11 19	0 11 55	0 12 33	0 13 13	0 13 57	0 14 43	0 15 28	0 16 14	0 17 3	0 17 55	0 18 50	0 19 47	0 20 46	0 21 45

LATITUDE 56° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 31 6	0 32 29	0 33 54	0 35 23	0 36 53	0 38 26	0 40 2	0 41 40	0 43 21	0 45 5	0 46 50	0 48 39	0 50 30	0 52 24	0 54 20
1	0 31 24	0 32 48	0 34 14	0 35 43	0 37 14	0 38 48	0 40 25	0 42 4	0 43 46	0 45 31	0 47 17	0 49 7	0 50 59	0 52 55	0 54 42
2	0 31 42	0 33 7	0 34 34	0 36 4	0 37 36	0 39 11	0 40 49	0 42 29	0 44 12	0 45 58	0 47 45	0 49 36	0 51 29	0 53 27	0 55 25
3	0 32 0	0 33 26	0 34 55	0 36 25	0 37 59	0 39 35	0 41 14	0 42 55	0 44 39	0 46 26	0 48 14	0 50 6	0 52 0	0 54 0	0 55 59
4	0 32 19	0 33 46	0 35 16	0 36 47	0 38 22	0 39 59	0 41 49	0 43 21	0 45 6	0 46 55	0 48 44	0 50 37	0 52 32	0 54 34	0 56 34
5	0 32 38	0 34 6	0 35 37	0 37 9	0 38 44	0 40 24	0 42 5	0 43 48	0 45 34	0 47 25	0 49 15	0 51 9	0 53 5	0 55 9	0 57 10
6	0 32 58	0 34 26	0 35 59	0 37 32	0 39 10	0 40 49	0 42 31	0 44 15	0 46 2	0 47 56	0 49 47	0 51 42	0 53 40	0 55 45	0 57 48
7	0 33 18	0 34 47	0 36 21	0 37 56	0 39 35	0 41 15	0 42 58	0 44 43	0 46 32	0 48 28	0 50 21	0 52 17	0 54 17	0 56 23	0 58 28
8	0 33 38	0 35 9	0 36 44	0 38 20	0 40 0	0 41 41	0 43 26	0 45 13	0 47 4	0 49 1	0 50 56	0 52 54	0 54 55	0 57 2	0 59 9
9	0 33 59	0 35 31	0 37 7	0 38 45	0 40 26	0 42 9	0 43 55	0 45 44	0 47 37	0 49 35	0 51 32	0 53 32	0 55 35	0 57 43	0 59 52
10	0 34 20	0 35 54	0 37 31	0 39 11	0 40 53	0 42 37	0 44 25	0 46 16	0 48 11	0 50 9	0 52 8	0 54 10	0 56 15	0 58 24	1 0 35
11	0 34 42	0 36 18	0 37 56	0 39 37	0 41 20	0 43 5	0 44 55	0 46 48	0 48 45	0 50 44	0 52 44	0 54 48	0 56 55	0 59 6	1 1 19
12	0 35 5	0 36 43	0 38 22	0 40 4	0 41 48	0 43 35	0 45 26	0 47 21	0 49 19	0 51 20	0 53 21	0 55 27	0 57 36	0 59 49	1 2 4
13	0 35 29	0 37 9	0 38 49	0 40 32	0 42 17	0 44 6	0 45 58	0 47 55	0 49 54	0 51 56	0 54 0	0 56 8	0 58 19	1 0 33	1 2 50
14	0 35 53	0 37 35	0 39 16	0 41 0	0 42 47	0 44 38	0 46 32	0 48 30	0 50 31	0 52 34	0 54 40	0 56 50	0 59 3	1 1 19	1 3 38
15	0 36 19	0 38 2	0 39 44	0 41 30	0 43 19	0 45 12	0 47 8	0 49 7	0 51 9	0 53 14	0 55 22	0 57 34	0 59 49	1 2 7	1 4 28
16	0 36 45	0 38 29	0 40 13	0 42 1	0 43 52	0 45 47	0 47 45	0 49 45	0 51 49	0 53 56	0 56 6	0 58 20	1 0 37	1 2 59	1 5 20
17	0 37 12	0 38 57	0 40 43	0 42 33	0 44 26	0 46 23	0 48 23	0 50 25	0 52 31	0 54 39	0 56 51	0 59 7	1 1 26	1 3 48	1 6 13
18	0 37 39	0 39 25	0 41 13	0 43 5	0 45 0	0 46 59	0 49 1	0 51 5	0 53 13	0 55 23	0 57 37	0 59 55	1 2 16	1 4 40	1 7 7
19	0 38 7	0 39 54	0 41 44	0 43 38	0 45 35	0 47 36	0 49 40	0 51 46	0 53 56	0 56 8	0 58 24	1 0 44	1 3 7	1 5 33	1 8 3
20	0 38 35	0 40 23	0 42 15	0 44 11	0 46 10	0 48 13	0 50 19	0 52 27	0 54 39	0 56 54	0 59 12	1 1 34	1 3 59	1 6 28	1 9 0
21	0 39 4	0 40 55	0 42 49	0 44 47	0 46 48	0 48 52	0 51 0	0 53 10	0 55 24	0 57 42	1 0 2	1 2 26	1 4 54	1 7 26	1 10 1
22	0 39 37	0 41 30	0 43 26	0 45 26	0 47 29	0 49 35	0 51 45	0 53 57	0 56 14	0 58 35	1 0 58	1 3 24	1 5 54	1 8 30	1 11 7
23	0 40 14	0 42 9	0 44 7	0 46 10	0 48 15	0 50 23	0 52 35	0 54 50	0 57 10	0 59 34	1 2 0	1 4 28	1 7 1	1 9 40	1 12 20

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 31 6	0 32 29	0 33 54	0 35 23	0 36 53	0 38 26	0 40 2	0 41 40	0 43 21	0 45 5	0 46 50	0 48 39	0 50 30	0 52 24	0 54 20
1	0 30 48	0 32 10	0 33 25	0 35 3	0 36 32	0 38 4	0 39 39	0 41 16	0 42 56	0 44 39	0 46 23	0 48 10	0 50 0	0 51 53	0 53 48
2	0 30 30	0 31 51	0 33 16	0 34 43	0 36 11	0 37 42	0 39 16	0 40 52	0 42 31	0 44 13	0 45 56	0 47 41	0 49 30	0 51 22	0 53 16
3	0 30 12	0 31 32	0 32 56	0 34 23	0 35 50	0 37 20	0 38 52	0 40 28	0 41 57	0 43 46	0 45 28	0 47 12	0 49 0	0 50 51	0 52 44
4	0 29 54	0 31 13	0 32 36	0 34 2	0 35 29	0 36 57	0 38 28	0 40 3	0 41 40	0 43 19	0 45 0	0 46 43	0 48 30	0 50 20	0 52 12
5	0 29 36	0 30 54	0 32 16	0 33 41	0 35 7	0 36 34	0 38 4	0 39 38	0 41 14	0 42 52	0 44 32	0 46 14	0 48 0	0 49 49	0 51 39
6	0 29 18	0 30 35	0 31 56	0 33 20	0 34 45	0 36 11	0 37 40	0 39 13	0 40 48	0 42 25	0 44 4	0 45 45	0 47 30	0 49 18	0 51 6
7	0 29 0	0 30 16	0 31 36	0 32 59	0 34 23	0 35 48	0 37 16	0 38 48	0 40 22	0 41 58	0 43 36	0 45 16	0 47 0	0 48 46	0 50 33
8	0 28 42	0 29 57	0 31 16	0 32 38	0 34 1	0 35 25	0 36 52	0 38 23	0 39 56	0 41 31	0 43 8	0 44 47	0 46 29	0 48 14	0 50 0
9	0 28 24	0 29 38	0 30 56	0 32 17	0 33 39	0 35 2	0 36 28	0 37 58	0 39 30	0 41 4	0 42 40	0 44 18	0 45 58	0 47 42	0 49 27
10	0 28 6	0 29 19	0 30 36	0 31 56	0 33 17	0 34 39	0 36 4	0 37 33	0 39 4	0 40 37	0 42 12	0 43 48	0 45 27	0 47 10	0 48 54
11	0 27 48	0 29 0	0 30 16	0 31 35	0 32 55	0 34 16	0 35 40	0 37 8	0 38 38	0 40 10	0 41 44	0 43 18	0 44 56	0 46 38	0 48 21
12	0 27 29	0 28 40	0 29 55	0 31 13	0 32 32	0 33 42	0 35 15	0 36 42	0 38 11	0 39 42	0 41 15	0 42 48	0 44 25	0 46 6	0 47 48
13	0 27 9	0 28 19	0 29 33	0 30 50	0 32 8	0 33 27	0 34 49	0 36 16	0 37 44	0 39 14	0 40 46	0 42 18	0 43 53	0 45 33	0 47 14
14	0 26 48	0 27 57	0 29 10	0 30 26	0 31 43	0 33 1	0 34 22	0 35 49	0 37 16	0 38 45	0 40 16	0 41 47	0 43 21	0 45 0	0 46 40
15	0 26 26	0 27 35	0 28 47	0 30 2	0 31 18	0 32 35	0 33 55	0 35 22	0 36 48	0 38 16	0 39 46	0 41 16	0 42 49	0 44 27	0 46 6
16	0 26 4	0 27 12	0 28 23	0 29 37	0 30 53	0 32 9	0 33 28	0 34 54	0 36 19	0 37 46	0 39 15	0 40 44	0 42 16	0 43 53	0 45 31
17	0 25 41	0 26 49	0 27 59	0 29 12	0 30 27	0 31 43	0 33 1	0 34 26	0 35 50	0 37 16	0 38 44	0 40 12	0 41 43	0 43 19	0 44 56
18	0 25 17	0 26 25	0 27 34	0 28 46	0 30 1	0 31 17	0 32 34	0 33 57	0 35 20	0 36 46	0 38 13	0 39 40	0 41 10	0 42 44	0 44 20
19	0 24 52	0 26 0	0 27 9	0 28 20	0 29 34	0 30 50	0 32 7	0 33 27	0 34 49	0 36 15	0 37 41	0 39 7	0 40 36	0 42 9	0 43 44
20	0 24 26	0 25 34	0 26 42	0 27 53	0 29 6	0 30 22	0 31 39	0 32 57	0 34 18	0 35 44	0 37 9	0 38 34	0 40 2	0 41 34	0 43 8
21	0 23 59	0 25 5	0 26 13	0 27 24	0 28 36	0 29 51	0 31 6	0 32 24	0 33 44	0 35 9	0 36 33	0 37 58	0 39 25	0 40 56	0 42 29
22	0 23 27	0 24 32	0 25 40	0 26 50	0 28 2	0 29 15	0 30 29	0 31 46	0 33 6	0 34 29	0 35 53	0 37 17	0 38 44	0 40 14	0 41 46
23	0 22 50	0 23 53	0 25 0	0 26 10	0 27 21	0 28 33	0 29 46	0 31 2	0 32 21	0 33 43	0 35 6	0 36 30	0 37 57	0 39 26	0 40 57

LATITUDE 56° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 56 18	0 58 20	1 0 24	1 2 30	1 4 39	1 6 50	1 9 3	1 11 20	1 13 39	1 16 0	1 18 24	1 20 50	1 23 18	1 25 49	1 28 23
1	0 56 52	0 58 55	1 1 0	1 3 7	1 5 17	1 7 29	1 9 43	1 12 2	1 14 23	1 16 46	1 19 12	1 21 39	1 24 8	1 26 41	1 29 17
2	0 57 27	0 59 31	1 1 37	1 3 45	1 5 56	1 8 9	1 10 24	1 12 45	1 15 8	1 17 33	1 20 2	1 22 30	1 25 0	1 27 35	1 30 13
3	0 58 3	1 0 8	1 2 15	1 4 24	1 6 36	1 8 50	1 11 7	1 13 29	1 15 54	1 18 22	1 20 53	1 23 23	1 25 54	1 28 31	1 31 11
4	0 58 40	1 0 46	1 2 54	1 5 5	1 7 18	1 9 34	1 11 53	1 14 16	1 16 42	1 19 13	1 21 46	1 24 18	1 26 51	1 29 29	1 32 11
5	0 59 18	1 1 25	1 3 35	1 5 48	1 8 3	1 10 21	1 12 42	1 15 6	1 17 33	1 20 6	1 22 41	1 25 15	1 27 50	1 30 29	1 33 13
6	0 59 57	1 2 6	1 4 18	1 6 33	1 8 50	1 11 10	1 13 33	1 15 59	1 18 27	1 21 1	1 23 38	1 26 14	1 28 51	1 31 32	1 34 17
7	1 0 38	1 2 49	1 5 3	1 7 20	1 9 39	1 12 1	1 14 26	1 16 54	1 19 24	1 21 59	1 24 37	1 27 15	1 29 54	1 32 37	1 35 25
8	1 1 20	1 3 33	1 5 49	1 8 8	1 10 29	1 12 53	1 15 20	1 17 50	1 20 22	1 22 59	1 25 38	1 28 18	1 30 59	1 33 44	1 36 34
9	1 2 4	1 4 19	1 6 36	1 8 57	1 11 20	1 13 46	1 16 15	1 18 47	1 21 21	1 24 0	1 26 40	1 29 22	1 32 5	1 34 52	1 37 44
10	1 2 48	1 5 5	1 7 25	1 9 48	1 12 13	1 14 41	1 17 12	1 19 46	1 22 23	1 25 3	1 27 45	1 30 29	1 33 14	1 36 3	1 38 57
11	1 3 34	1 5 53	1 8 15	1 10 40	1 13 7	1 15 37	1 18 10	1 20 46	1 23 25	1 26 7	1 28 52	1 31 38	1 34 25	1 37 16	1 40 12
12	1 4 21	1 6 42	1 9 6	1 11 33	1 14 2	1 16 34	1 19 9	1 21 47	1 24 28	1 27 12	1 30 1	1 32 49	1 35 39	1 38 32	1 41 30
13	1 5 9	1 7 32	1 9 58	1 12 27	1 14 58	1 17 32	1 20 9	1 22 49	1 25 32	1 28 18	1 31 12	1 34 2	1 36 55	1 39 50	1 42 50
14	1 5 59	1 8 24	1 10 52	1 13 23	1 15 56	1 18 32	1 21 11	1 23 53	1 26 38	1 29 26	1 32 25	1 35 17	1 38 13	1 41 11	1 44 13
15	1 6 51	1 9 18	1 11 48	1 14 21	1 16 56	1 19 34	1 22 15	1 24 59	1 27 46	1 30 36	1 33 40	1 36 34	1 39 33	1 42 34	1 45 38
16	1 7 45	1 10 14	1 12 46	1 15 21	1 17 58	1 20 38	1 23 21	1 26 7	1 28 57	1 31 49	1 34 56	1 37 53	1 40 55	1 43 59	1 47 5
17	1 8 40	1 11 12	1 13 46	1 16 23	1 19 3	1 21 45	1 24 30	1 27 18	1 30 11	1 33 6	1 36 14	1 39 14	1 42 19	1 45 26	1 49 34
18	1 9 37	1 12 11	1 14 47	1 17 27	1 20 10	1 22 55	1 25 42	1 28 33	1 31 29	1 34 27	1 37 34	1 40 37	1 43 45	1 46 55	1 50 6
19	1 10 36	1 13 12	1 15 50	1 18 32	1 21 18	1 24 6	1 26 55	1 29 49	1 32 48	1 35 49	1 38 56	1 42 2	1 45 13	1 48 26	1 51 40
20	1 11 36	1 14 14	1 16 55	1 19 40	1 22 29	1 25 20	1 28 12	1 31 9	1 34 11	1 37 15	1 40 20	1 43 29	1 46 43	1 49 59	1 53 16
21	1 12 39	1 15 19	1 18 3	1 20 51	1 23 43	1 26 37	1 29 33	1 32 33	1 35 38	1 38 44	1 41 51	1 45 3	1 48 20	1 51 39	1 54 57
22	1 13 47	1 16 29	1 19 16	1 22 7	1 25 2	1 27 59	1 30 58	1 34 2	1 37 10	1 40 19	1 43 28	1 46 43	1 50 3	1 53 26	1 56 48
23	1 15 1	1 17 46	1 20 36	1 23 30	1 26 28	1 29 28	1 32 30	1 35 37	1 38 49	1 42 1	1 45 13	1 48 31	1 51 55	1 55 21	1 58 49

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 56 18	0 58 20	1 0 24	1 2 30	1 4 39	1 6 50	1 9 3	1 11 20	1 13 39	1 16 0	1 18 24	1 20 50	1 23 18	1 25 49	1 28 23
1	0 55 45	0 57 45	0 59 48	1 1 53	1 4 1	1 6 10	1 8 22	1 10 37	1 12 55	1 15 15	1 17 36	1 20 1	1 22 27	1 24 57	1 27 29
2	0 55 12	0 57 10	0 59 12	1 1 16	1 3 22	1 5 30	1 7 41	1 9 54	1 12 11	1 14 30	1 16 48	1 19 12	1 21 36	1 24 5	1 26 35
3	0 54 39	0 56 35	0 58 36	1 0 39	1 2 43	1 4 50	1 7 0	1 9 11	1 11 26	1 13 44	1 16 0	1 18 23	1 20 45	1 23 13	1 25 41
4	0 54 5	0 56 0	0 58 0	1 0 2	1 2 4	1 4 10	1 6 19	1 8 28	1 10 42	1 12 58	1 15 12	1 17 34	1 19 54	1 22 21	1 24 47
5	0 53 31	0 55 25	0 57 24	0 59 24	1 1 25	1 3 30	1 5 38	1 7 45	1 9 58	1 12 12	1 14 25	1 16 45	1 19 4	1 21 29	1 23 54
6	0 52 57	0 54 50	0 56 48	0 58 46	1 0 46	1 2 50	1 4 56	1 7 2	1 9 13	1 11 26	1 13 38	1 15 56	1 18 14	1 20 37	1 23 1
7	0 52 23	0 54 15	0 56 11	0 58 8	1 0 7	1 2 10	1 4 14	1 6 19	1 8 28	1 10 40	1 12 51	1 15 7	1 17 24	1 19 45	1 22 8
8	0 51 49	0 53 40	0 55 34	0 57 30	0 59 28	1 1 30	1 3 32	1 5 36	1 7 43	1 9 54	1 12 4	1 14 18	1 16 34	1 18 53	1 21 15
9	0 51 15	0 53 5	0 54 57	0 56 52	0 58 49	1 0 49	1 2 50	1 4 53	1 6 59	1 9 8	1 11 17	1 13 29	1 15 44	1 18 1	1 20 22
10	0 50 41	0 52 29	0 54 20	0 56 14	0 58 10	1 0 8	1 2 8	1 4 10	1 6 15	1 8 22	1 10 30	1 12 41	1 14 54	1 17 10	1 19 29
11	0 50 7	0 51 53	0 53 43	0 55 36	0 57 31	0 59 27	1 1 26	1 3 27	1 5 31	1 7 36	1 9 43	1 11 53	1 14 5	1 16 19	1 18 37
12	0 49 33	0 51 17	0 53 6	0 54 58	0 56 51	0 58 46	1 0 44	1 2 44	1 4 47	1 6 50	1 8 56	1 11 5	1 13 16	1 15 28	1 17 45
13	0 48 59	0 50 41	0 52 29	0 54 20	0 56 11	0 58 5	1 0 2	1 2 1	1 4 3	1 6 4	1 8 9	1 10 17	1 12 27	1 14 37	1 16 53
14	0 48 24	0 50 5	0 51 52	0 53 42	0 55 31	0 57 24	0 59 20	1 1 18	1 3 18	1 5 18	1 7 22	1 9 29	1 11 38	1 13 46	1 16 1
15	0 47 49	0 49 29	0 51 15	0 53 3	0 54 51	0 56 43	0 58 38	1 0 35	1 2 33	1 4 32	1 6 35	1 8 41	1 10 48	1 12 55	1 15 8
16	0 47 13	0 48 53	0 50 38	0 52 24	0 54 12	0 56 2	0 57 56	0 59 51	1 1 48	1 3 46	1 5 48	1 7 52	1 9 58	1 12 4	1 14 15
17	0 46 37	0 48 16	0 50 0	0 51 45	0 53 31	0 55 21	0 57 14	0 59 7	1 1 3	1 3 0	1 5 1	1 7 3	1 9 8	1 11 13	1 13 22
18	0 46 0	0 47 39	0 49 22	0 51 6	0 52 51	0 54 40	0 56 31	0 58 23	1 0 18	1 2 14	1 4 14	1 6 14	1 8 18	1 10 22	1 12 29
19	0 45 23	0 47 2	0 48 44	0 50 27	0 52 11	0 53 59	0 55 48	0 57 39	0 59 33	1 1 28	1 3 26	1 5 25	1 7 28	1 9 31	1 11 36
20	0 44 46	0 46 25	0 48 6	0 49 48	0 51 31	0 53 17	0 55 5	0 56 55	0 58 48	1 0 42	1 2 38	1 4 36	1 6 38	1 8 40	1 10 43
21	0 44 6	0 45 44	0 47 23	0 49 5	0 50 48	0 52 33	0 54 19	0 56 8	0 58 0	0 59 53	1 1 48	1 3 45	1 5 45	1 7 45	1 9 48
22	0 43 21	0 44 58	0 46 34	0 48 16	0 49 59	0 51 43	0 53 28	0 55 16	0 57 8	0 59 0	1 0 54	1 2 49	1 4 46	1 6 45	1 8 48
23	0 42 30	0 44 5	0 45 41	0 47 20	0 49 2	0 50 45	0 52 29	0 54 16	0 56 7	0 57 59	0 59 52	1 1 46	1 3 40	1 5 37	1 7 39

LATITUDE 57° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 9 55	0 10 0	0 10 6	0 10 15	0 10 27	0 10 41	0 10 57	0 11 16	0 11 38	0 12 2	0 12 29	0 12 59	0 13 30	0 14 5	0 14 42
1	0 9 59	0 10 4	0 10 8	0 10 19	0 10 31	0 10 45	0 11 2	0 11 21	0 11 43	0 12 7	0 12 34	0 13 4	0 13 36	0 14 10	0 14 47
2	0 10 2	0 10 6	0 10 10	0 10 22	0 10 34	0 10 48	0 11 6	0 11 25	0 11 47	0 12 12	0 12 39	0 13 9	0 13 41	0 14 15	0 14 53
3	0 10 5	0 10 8	0 10 12	0 10 25	0 10 37	0 10 51	0 11 10	0 11 29	0 11 51	0 12 16	0 12 43	0 13 14	0 13 46	0 14 21	0 14 59
4	0 10 9	0 10 12	0 10 18	0 10 28	0 10 40	0 10 55	0 11 14	0 11 34	0 11 56	0 12 21	0 12 48	0 13 19	0 13 52	0 14 27	0 15 7
5	0 10 12	0 10 16	0 10 24	0 10 31	0 10 44	0 10 59	0 11 17	0 11 38	0 12 0	0 12 25	0 12 53	0 13 23	0 13 56	0 14 34	0 15 15
6	0 10 14	0 10 18	0 10 27	0 10 34	0 10 47	0 11 2	0 11 20	0 11 42	0 12 4	0 12 30	0 12 58	0 13 28	0 14 1	0 14 39	0 15 22
7	0 10 16	0 10 20	0 10 30	0 10 37	0 10 50	0 11 5	0 11 23	0 11 46	0 12 8	0 12 34	0 13 3	0 13 33	0 14 7	0 14 44	0 15 28
8	0 10 18	0 10 22	0 10 32	0 10 40	0 10 53	0 11 8	0 11 26	0 11 49	0 12 12	0 12 38	0 13 8	0 13 38	0 14 13	0 14 50	0 15 32
9	0 10 20	0 10 25	0 10 34	0 10 43	0 10 56	0 11 11	0 11 29	0 11 52	0 12 16	0 12 42	0 13 12	0 13 43	0 14 19	0 14 56	0 15 40
10	0 10 22	0 10 28	0 10 36	0 10 46	0 10 59	0 11 14	0 11 33	0 11 55	0 12 19	0 12 46	0 13 16	0 13 49	0 14 25	0 15 2	0 15 46
11	0 10 24	0 10 31	0 10 38	0 10 49	0 11 2	0 11 17	0 11 36	0 11 58	0 12 23	0 12 51	0 13 21	0 13 55	0 14 30	0 15 8	0 15 53
12	0 10 26	0 10 34	0 10 40	0 10 52	0 11 5	0 11 20	0 11 39	0 12 1	0 12 27	0 12 56	0 13 26	0 14 0	0 14 35	0 15 14	0 16 0
13	0 10 28	0 10 36	0 10 42	0 10 54	0 11 7	0 11 23	0 11 42	0 12 4	0 12 31	0 13 0	0 13 31	0 14 5	0 14 40	0 15 20	0 16 7
14	0 10 30	0 10 38	0 10 44	0 10 56	0 11 9	0 11 26	0 11 45	0 12 7	0 12 35	0 13 4	0 13 36	0 14 10	0 14 45	0 15 26	0 16 14
15	0 10 32	0 10 40	0 10 46	0 10 58	0 11 11	0 11 28	0 11 48	0 12 10	0 12 39	0 13 8	0 13 41	0 14 15	0 14 50	0 15 32	0 16 21
16	0 10 34	0 10 41	0 10 48	0 11 0	0 11 13	0 11 30	0 11 51	0 12 13	0 12 42	0 13 12	0 13 45	0 14 20	0 14 56	0 15 39	0 16 28
17	0 10 36	0 10 42	0 10 50	0 11 2	0 11 15	0 11 32	0 11 53	0 12 16	0 12 45	0 13 16	0 13 49	0 14 25	0 15 2	0 15 46	0 16 35
18	0 10 38	0 10 43	0 10 52	0 11 4	0 11 17	0 11 34	0 11 55	0 12 19	0 12 48	0 13 20	0 13 53	0 14 30	0 15 8	0 15 53	0 16 42
19	0 10 40	0 10 44	0 10 54	0 11 6	0 11 19	0 11 36	0 11 57	0 12 22	0 12 51	0 13 24	0 13 57	0 14 35	0 15 14	0 16 0	0 16 49
20	0 10 41	0 10 45	0 10 55	0 11 8	0 11 22	0 11 38	0 11 59	0 12 25	0 12 54	0 13 28	0 14 1	0 14 40	0 15 20	0 16 7	0 16 56
21	0 10 41	0 10 46	0 10 56	0 11 9	0 11 23	0 11 40	0 12 1	0 12 28	0 12 57	0 13 31	0 14 5	0 14 45	0 15 26	0 16 13	0 17 2
22	0 10 42	0 10 47	0 10 57	0 11 10	0 11 24	0 11 41	0 12 3	0 12 31	0 13 0	0 13 34	0 14 9	0 14 50	0 15 32	0 16 19	0 17 8
23	0 10 42	0 10 49	0 10 59	0 11 11	0 11 25	0 11 42	0 12 4	0 12 33	0 13 4	0 13 37	0 14 14	0 14 55	0 15 38	0 16 24	0 17 14

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 9 55	0 10 0	0 10 6	0 10 15	0 10 27	0 10 41	0 10 57	0 11 16	0 11 37	0 12 2	0 12 29	0 12 59	0 13 30	0 14 5	0 14 42
1	0 9 52	0 9 56	0 10 2	0 10 11	0 10 23	0 10 37	0 10 53	0 11 12	0 11 34	0 11 57	0 12 24	0 12 54	0 13 24	0 13 58	0 14 35
2	0 9 49	0 9 52	0 9 58	0 10 7	0 10 19	0 10 33	0 10 49	0 11 8	0 11 29	0 11 52	0 12 19	0 12 48	0 13 18	0 13 51	0 14 28
3	0 9 45	0 9 47	0 9 54	0 10 3	0 10 15	0 10 28	0 10 45	0 11 3	0 11 24	0 11 47	0 12 13	0 12 42	0 13 12	0 13 44	0 14 20
4	0 9 40	0 9 42	0 9 49	0 9 58	0 10 10	0 10 23	0 10 40	0 10 57	0 11 18	0 11 41	0 12 6	0 12 35	0 13 5	0 13 37	0 14 12
5	0 9 35	0 9 37	0 9 44	0 9 53	0 10 5	0 10 17	0 10 34	0 10 51	0 11 12	0 11 35	0 11 59	0 12 28	0 12 58	0 13 29	0 14 4
6	0 9 30	0 9 32	0 9 39	0 9 48	0 9 59	0 10 11	0 10 28	0 10 45	0 11 6	0 11 28	0 11 52	0 12 21	0 12 50	0 13 21	0 13 55
7	0 9 24	0 9 27	0 9 34	0 9 43	0 9 53	0 10 5	0 10 22	0 10 39	0 11 0	0 11 21	0 11 45	0 12 13	0 12 42	0 13 13	0 13 47
8	0 9 18	0 9 22	0 9 29	0 9 37	0 9 47	0 9 59	0 10 15	0 10 33	0 10 53	0 11 14	0 11 38	0 12 5	0 12 34	0 13 6	0 13 39
9	0 9 12	0 9 16	0 9 22	0 9 31	0 9 41	0 9 53	0 10 8	0 10 26	0 10 46	0 11 7	0 11 31	0 11 58	0 12 27	0 12 59	0 13 31
10	0 9 7	0 9 11	0 9 16	0 9 25	0 9 35	0 9 47	0 10 2	0 10 20	0 10 39	0 11 1	0 11 24	0 11 51	0 12 20	0 12 52	0 13 24
11	0 9 2	0 9 6	0 9 10	0 9 19	0 9 29	0 9 41	0 9 55	0 10 13	0 10 32	0 10 54	0 11 17	0 11 43	0 12 13	0 12 44	0 13 16
12	0 8 56	0 9 0	0 9 4	0 9 13	0 9 23	0 9 34	0 9 48	0 10 6	0 10 25	0 10 47	0 11 10	0 11 36	0 12 5	0 12 36	0 13 8
13	0 8 47	0 8 51	0 8 55	0 9 4	0 9 16	0 9 25	0 9 39	0 9 57	0 10 13	0 10 38	0 11 1	0 11 26	0 11 54	0 12 25	0 12 57
14	0 8 36	0 8 40	0 8 44	0 8 53	0 9 2	0 9 14	0 9 28	0 9 46	0 10 5	0 10 26	0 10 49	0 11 13	0 11 41	0 12 11	0 12 43
15	0 8 23	0 8 27	0 8 31	0 8 39	0 8 48	0 9 0	0 9 16	0 9 32	0 9 51	0 10 12	0 10 34	0 10 58	0 11 25	0 11 55	0 12 27
16	0 8 10	0 8 14	0 8 18	0 8 26	0 8 35	0 8 47	0 9 2	0 9 18	0 9 37	0 9 58	0 10 20	0 10 44	0 11 10	0 11 40	0 12 12
17	0 7 57	0 8 1	0 8 6	0 8 13	0 8 22	0 8 34	0 8 49	0 9 4	0 9 23	0 9 44	0 10 6	0 10 30	0 10 55	0 11 25	0 11 57
18	0 7 44	0 7 48	0 7 54	0 8 1	0 8 9	0 8 21	0 8 35	0 8 50	0 9 8	0 9 29	0 9 51	0 10 15	0 10 41	0 11 10	0 11 41
19	0 7 28	0 7 32	0 7 38	0 7 45	0 7 53	0 8 5	0 8 18	0 8 34	0 8 51	0 9 12	0 9 34	0 9 57	0 10 23	0 10 52	0 11 23
20	0 7 9	0 7 13	0 7 18	0 7 26	0 7 34	0 7 46	0 7 59	0 8 15	0 8 32	0 8 52	0 9 14	0 9 37	0 10 3	0 10 31	0 11 2
21	0 6 48	0 6 51	0 6 55	0 7 3	0 7 13	0 7 24	0 7 37	0 7 52	0 8 9	0 8 29	0 8 51	0 9 14	0 9 39	0 10 7	0 10 37
22	0 6 22	0 6 25	0 6 29	0 6 37	0 6 57	0 6 58	0 7 10	0 7 25	0 7 42	0 8 1	0 8 23	0 8 48	0 9 12	0 9 38	0 10 7
23	0 5 49	0 5 53	0 5 59	0 6 6	0 6 14	0 6 24	0 6 37	0 6 52	0 7 9	0 7 28	0 7 50	0 8 14	0 8 39	0 9 4	0 9 32

LATITUDE 57° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 15 21	0 16 3	0 16 47	0 17 34	0 18 24	0 19 16	0 20 11	0 21 7	0 22 7	0 23 10	0 24 15	0 25 22	0 26 31	0 27 44	0 28 59
1	0 15 27	0 16 9	0 16 54	0 17 41	0 18 33	0 19 25	0 20 21	0 21 18	0 22 18	0 23 21	0 24 27	0 25 35	0 26 45	0 27 59	0 29 14
2	0 15 33	0 16 16	0 17 2	0 17 49	0 18 42	0 19 34	0 20 31	0 21 29	0 22 30	0 23 33	0 24 39	0 25 49	0 26 59	0 28 15	0 29 30
3	0 15 39	0 16 23	0 17 10	0 17 57	0 18 51	0 19 44	0 20 41	0 21 40	0 22 42	0 23 45	0 24 52	0 26 3	0 27 14	0 28 31	0 29 46
4	0 15 47	0 16 31	0 17 19	0 18 7	0 19 0	0 19 54	0 20 52	0 21 52	0 22 54	0 23 58	0 25 6	0 26 18	0 27 30	0 28 48	0 30 4
5	0 15 55	0 16 40	0 17 28	0 18 18	0 19 9	0 20 4	0 21 3	0 22 4	0 23 6	0 24 12	0 25 20	0 26 33	0 27 46	0 29 5	0 30 22
6	0 16 2	0 16 47	0 17 36	0 18 26	0 19 18	0 20 14	0 21 14	0 22 16	0 23 19	0 24 26	0 25 34	0 26 48	0 28 2	0 29 22	0 30 40
7	0 16 9	0 16 55	0 17 44	0 18 34	0 19 27	0 20 24	0 21 25	0 22 28	0 23 32	0 24 40	0 25 49	0 27 3	0 28 18	0 29 39	0 30 58
8	0 16 16	0 17 3	0 17 52	0 18 42	0 19 37	0 20 35	0 21 36	0 22 41	0 23 45	0 24 54	0 26 4	0 27 18	0 28 34	0 29 56	0 31 16
9	0 16 23	0 17 12	0 18 0	0 18 50	0 19 47	0 20 46	0 21 47	0 22 54	0 23 59	0 24 58	0 26 19	0 27 34	0 28 51	0 30 13	0 31 35
10	0 16 30	0 17 19	0 18 8	0 18 59	0 19 57	0 20 57	0 21 59	0 23 8	0 24 13	0 25 22	0 26 34	0 27 50	0 29 8	0 30 30	0 31 54
11	0 16 37	0 17 27	0 18 17	0 19 9	0 20 7	0 21 8	0 22 11	0 23 20	0 24 27	0 25 37	0 26 50	0 28 7	0 29 26	0 30 48	0 32 14
12	0 16 44	0 17 35	0 18 26	0 19 19	0 20 17	0 21 19	0 22 23	0 23 33	0 24 41	0 25 52	0 27 6	0 28 24	0 29 44	0 31 7	0 32 34
13	0 16 51	0 17 43	0 18 35	0 19 29	0 20 28	0 21 30	0 22 36	0 23 46	0 24 55	0 26 7	0 27 22	0 28 41	0 30 3	0 31 27	0 32 55
14	0 16 58	0 17 51	0 18 44	0 19 39	0 20 39	0 21 42	0 22 49	0 23 59	0 25 9	0 26 23	0 27 39	0 28 59	0 30 22	0 31 47	0 33 16
15	0 17 6	0 17 59	0 18 53	0 19 49	0 20 50	0 21 54	0 23 2	0 24 12	0 25 23	0 26 39	0 27 56	0 29 17	0 30 41	0 32 8	0 33 38
16	0 17 13	0 18 7	0 19 2	0 19 59	0 21 1	0 22 6	0 23 15	0 24 25	0 25 37	0 26 55	0 28 13	0 29 35	0 31 0	0 32 29	0 34 0
17	0 17 22	0 18 15	0 19 12	0 20 9	0 21 12	0 22 18	0 23 28	0 24 38	0 25 51	0 27 11	0 28 30	0 29 56	0 31 20	0 32 50	0 34 23
18	0 17 30	0 18 23	0 19 20	0 20 19	0 21 23	0 22 30	0 23 41	0 24 52	0 26 6	0 27 27	0 28 48	0 30 13	0 31 40	0 33 12	0 34 46
19	0 17 38	0 18 32	0 19 29	0 20 30	0 21 34	0 22 42	0 23 54	0 25 6	0 26 21	0 27 43	0 29 6	0 30 33	0 32 1	0 33 34	0 35 9
20	0 17 46	0 18 41	0 19 38	0 20 41	0 21 45	0 22 54	0 24 7	0 25 20	0 26 36	0 27 59	0 29 23	0 30 53	0 32 22	0 33 57	0 35 33
21	0 17 54	0 18 49	0 19 48	0 20 52	0 21 57	0 23 7	0 24 21	0 25 36	0 26 52	0 28 16	0 29 43	0 31 14	0 32 44	0 34 21	0 35 58
22	0 18 1	0 18 57	0 19 58	0 21 3	0 22 9	0 23 20	0 24 36	0 25 53	0 27 10	0 28 34	0 30 3	0 31 35	0 33 7	0 34 46	0 36 25
23	0 18 8	0 19 6	0 20 9	0 21 14	0 22 21	0 23 33	0 24 51	0 26 10	0 27 30	0 28 54	0 30 24	0 31 57	0 33 32	0 35 11	0 36 54

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 15 21	0 16 3	0 16 47	0 17 34	0 18 24	0 19 16	0 20 11	0 21 7	0 22 7	0 23 10	0 24 15	0 25 22	0 26 31	0 27 44	0 28 59
1	0 15 13	0 15 55	0 16 39	0 17 26	0 18 15	0 19 7	0 20 1	0 20 57	0 21 56	0 22 58	0 24 2	0 25 8	0 26 17	0 27 29	0 28 42
2	0 15 5	0 15 47	0 16 31	0 17 17	0 18 6	0 18 57	0 19 51	0 20 46	0 21 45	0 22 45	0 23 48	0 24 54	0 26 2	0 27 13	0 28 25
3	0 14 57	0 15 38	0 16 22	0 17 8	0 17 56	0 18 47	0 19 40	0 20 35	0 21 33	0 22 32	0 23 34	0 24 39	0 25 47	0 26 57	0 28 9
4	0 14 47	0 15 29	0 16 13	0 16 59	0 17 46	0 18 36	0 19 29	0 20 23	0 21 21	0 22 19	0 23 21	0 24 25	0 25 32	0 26 42	0 27 53
5	0 14 39	0 15 20	0 16 3	0 16 49	0 17 36	0 18 25	0 19 18	0 20 11	0 21 9	0 22 6	0 23 8	0 24 11	0 25 17	0 26 26	0 27 37
6	0 14 30	0 15 10	0 15 53	0 16 39	0 17 26	0 18 14	0 19 7	0 19 59	0 20 56	0 21 53	0 22 55	0 23 57	0 25 2	0 26 10	0 27 21
7	0 14 21	0 15 0	0 15 43	0 16 29	0 17 16	0 18 3	0 18 55	0 19 47	0 20 43	0 21 40	0 22 41	0 23 43	0 24 47	0 25 54	0 27 4
8	0 14 12	0 14 50	0 15 34	0 16 19	0 17 5	0 17 52	0 18 43	0 19 35	0 20 30	0 21 27	0 22 27	0 23 29	0 24 32	0 25 38	0 26 47
9	0 14 3	0 14 41	0 15 25	0 16 9	0 16 54	0 17 41	0 18 31	0 19 23	0 20 17	0 21 13	0 22 13	0 23 14	0 24 17	0 25 22	0 26 30
10	0 13 56	0 14 33	0 15 16	0 15 59	0 16 44	0 17 30	0 18 19	0 19 11	0 20 4	0 20 59	0 21 59	0 23 0	0 24 3	0 25 7	0 26 14
11	0 13 49	0 14 25	0 15 7	0 15 49	0 16 32	0 17 19	0 18 8	0 18 59	0 19 51	0 20 46	0 21 45	0 22 45	0 23 48	0 24 52	0 25 58
12	0 13 42	0 14 18	0 14 57	0 15 38	0 16 22	0 17 8	0 17 57	0 18 47	0 19 39	0 20 33	0 21 30	0 22 30	0 23 33	0 24 37	0 25 42
13	0 13 30	0 14 6	0 14 45	0 15 26	0 16 9	0 16 54	0 17 42	0 18 32	0 19 23	0 20 16	0 21 13	0 22 12	0 23 15	0 24 18	0 25 22
14	0 13 16	0 13 52	0 14 31	0 15 11	0 15 54	0 16 38	0 17 26	0 18 15	0 19 5	0 19 58	0 20 55	0 21 53	0 22 55	0 23 57	0 25 1
15	0 13 0	0 13 36	0 14 14	0 14 54	0 15 36	0 16 21	0 17 8	0 17 56	0 18 46	0 19 39	0 20 35	0 21 33	0 22 33	0 23 35	0 24 39
16	0 12 45	0 13 20	0 13 57	0 14 37	0 15 19	0 16 4	0 16 50	0 17 38	0 18 28	0 19 20	0 20 15	0 21 12	0 22 11	0 23 13	0 24 17
17	0 12 29	0 13 4	0 13 41	0 14 20	0 15 2	0 15 46	0 16 31	0 17 19	0 18 9	0 19 1	0 19 55	0 20 51	0 21 49	0 22 51	0 23 55
18	0 12 13	0 12 48	0 13 25	0 14 4	0 14 44	0 15 27	0 16 12	0 17 0	0 17 50	0 18 41	0 19 33	0 20 29	0 21 27	0 22 29	0 23 33
19	0 11 55	0 12 29	0 13 5	0 13 44	0 14 24	0 15 6	0 15 51	0 16 38	0 17 27	0 18 18	0 19 10	0 20 5	0 21 3	0 22 4	0 23 7
20	0 11 34	0 12 7	0 12 42	0 13 21	0 14 1	0 14 43	0 15 27	0 16 14	0 17 2	0 17 52	0 18 45	0 19 39	0 20 36	0 21 36	0 22 38
21	0 11 9	0 11 42	0 12 17	0 12 54	0 13 34	0 14 16	0 15 0	0 15 46	0 16 33	0 17 23	0 18 16	0 19 10	0 20 6	0 21 4	0 22 5
22	0 10 39	0 11 12	0 11 47	0 12 23	0 13 3	0 13 45	0 14 29	0 15 14	0 16 1	0 16 50	0 17 42	0 18 36	0 19 31	0 20 29	0 21 28
23	0 10 4	0 10 37	0 11 12	0 11 49	0 12 27	0 13 8	0 13 52	0 14 37	0 15 24	0 16 13	0 17 3	0 17 56	0 18 51	0 19 48	0 20 46

LATITUDE 57° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 30 16	0 31 35	0 32 58	0 34 23	0 35 50	0 37 19	0 38 52	0 40 26	0 42 4	0 43 44	0 45 26	0 47 10	0 48 57	0 50 46	0 52 38
1	0 30 32	0 31 53	0 33 17	0 34 43	0 36 11	0 37 41	0 39 14	0 40 50	0 42 30	0 44 9	0 45 52	0 47 38	0 49 27	0 51 17	0 53 10
2	0 30 49	0 32 11	0 33 36	0 35 3	0 36 32	0 38 3	0 39 37	0 41 14	0 42 56	0 44 35	0 46 18	0 48 7	0 49 58	0 51 49	0 53 42
3	0 31 6	0 32 29	0 33 55	0 35 23	0 36 54	0 38 25	0 40 0	0 41 38	0 43 18	0 45 1	0 46 46	0 48 36	0 50 29	0 52 21	0 54 15
4	0 31 24	0 32 48	0 34 15	0 35 44	0 37 16	0 38 48	0 40 23	0 42 3	0 43 50	0 45 28	0 47 14	0 49 6	0 51 0	0 52 54	0 54 48
5	0 31 42	0 33 8	0 34 35	0 36 5	0 37 38	0 39 12	0 40 47	0 42 30	0 44 17	0 45 56	0 47 43	0 49 37	0 51 31	0 53 28	0 55 22
6	0 32 1	0 33 28	0 34 56	0 36 27	0 38 1	0 39 36	0 41 12	0 42 56	0 44 44	0 46 24	0 48 13	0 50 8	0 52 3	0 54 2	0 55 57
7	0 32 20	0 33 49	0 35 17	0 36 49	0 38 24	0 40 0	0 41 38	0 43 23	0 45 11	0 46 53	0 48 44	0 50 40	0 52 36	0 54 37	0 56 33
8	0 32 39	0 34 10	0 35 39	0 37 11	0 38 47	0 40 24	0 42 5	0 43 50	0 45 38	0 47 23	0 49 16	0 51 12	0 53 10	0 55 12	0 57 10
9	0 32 59	0 34 31	0 36 1	0 37 34	0 39 11	0 40 49	0 42 32	0 44 18	0 46 6	0 47 54	0 49 48	0 51 45	0 53 45	0 55 47	0 57 49
10	0 33 20	0 34 52	0 36 23	0 37 57	0 39 35	0 41 15	0 43 0	0 44 46	0 46 34	0 48 26	0 50 21	0 52 20	0 54 21	0 56 23	0 58 29
11	0 33 41	0 35 14	0 36 45	0 38 20	0 40 0	0 41 42	0 43 29	0 45 16	0 47 5	0 48 59	0 50 55	0 52 55	0 54 58	0 57 1	0 59 10
12	0 34 3	0 35 36	0 37 8	0 38 44	0 40 26	0 42 10	0 43 59	0 45 47	0 47 38	0 49 34	0 51 30	0 53 31	0 55 37	0 57 41	0 59 53
13	0 34 25	0 35 59	0 37 32	0 39 9	0 40 53	0 42 39	0 44 30	0 46 19	0 48 12	0 50 10	0 52 5	0 54 9	0 56 18	0 58 23	1 0 37
14	0 34 47	0 36 23	0 37 58	0 39 35	0 41 21	0 43 9	0 45 1	0 46 52	0 48 47	0 50 47	0 52 42	0 54 48	0 57 0	0 59 6	1 1 22
15	0 35 10	0 36 47	0 38 24	0 40 2	0 41 50	0 43 40	0 45 33	0 47 26	0 49 23	0 51 24	0 53 20	0 55 28	0 57 43	0 59 51	1 2 8
16	0 35 33	0 37 12	0 38 51	0 40 30	0 42 19	0 44 11	0 46 5	0 48 0	0 49 59	0 52 2	0 54 0	0 56 10	0 58 26	1 0 36	1 2 54
17	0 35 57	0 37 37	0 39 18	0 40 59	0 42 49	0 44 43	0 46 38	0 48 35	0 50 36	0 52 40	0 54 41	0 56 53	0 59 10	1 1 22	1 3 41
18	0 36 21	0 38 3	0 39 46	0 41 29	0 43 21	0 45 16	0 47 12	0 49 11	0 51 14	0 53 19	0 55 24	0 57 37	0 59 55	1 2 9	1 4 30
19	0 36 46	0 38 30	0 40 15	0 42 1	0 43 54	0 45 49	0 47 47	0 49 48	0 51 53	0 53 59	0 56 8	0 58 22	1 0 41	1 2 58	1 5 20
20	0 37 12	0 38 57	0 40 45	0 42 34	0 44 28	0 46 23	0 48 23	0 50 26	0 52 33	0 54 41	0 56 53	0 59 8	1 1 29	1 3 50	1 6 12
21	0 37 39	0 39 26	0 41 16	0 43 7	0 45 3	0 46 59	0 49 1	0 51 6	0 53 15	0 55 25	0 57 40	0 59 57	1 2 20	1 4 43	1 7 8
22	0 38 8	0 39 57	0 41 49	0 43 42	0 45 40	0 47 38	0 49 41	0 51 49	0 54 0	0 56 12	0 58 30	1 0 50	1 3 14	1 5 39	1 8 7
23	0 38 38	0 40 30	0 42 23	0 44 19	0 46 18	0 48 19	0 50 24	0 52 35	0 54 47	0 57 2	0 59 22	1 1 46	1 4 12	1 6 39	1 9 11

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 30 16	0 31 35	0 32 58	0 34 23	0 35 50	0 37 19	0 38 52	0 40 26	0 42 4	0 43 44	0 45 26	0 47 10	0 48 57	0 50 46	0 52 38
1	0 29 59	0 31 18	0 32 39	0 34 4	0 35 30	0 36 57	0 38 28	0 40 2	0 41 39	0 43 18	0 44 59	0 46 42	0 48 28	0 50 16	0 52 6
2	0 29 41	0 31 0	0 32 20	0 33 44	0 35 9	0 36 35	0 38 4	0 39 38	0 41 14	0 42 52	0 44 32	0 46 14	0 47 59	0 49 46	0 51 35
3	0 29 23	0 30 41	0 32 1	0 33 24	0 34 48	0 36 13	0 37 41	0 39 14	0 40 49	0 42 26	0 44 5	0 45 46	0 47 30	0 49 16	0 51 4
4	0 29 5	0 30 23	0 31 42	0 33 4	0 34 27	0 35 51	0 37 18	0 38 50	0 40 24	0 42 0	0 43 38	0 45 18	0 47 1	0 48 46	0 50 33
5	0 28 48	0 30 5	0 31 23	0 32 44	0 34 7	0 35 29	0 36 56	0 38 26	0 39 59	0 41 34	0 43 11	0 44 50	0 46 32	0 48 16	0 50 2
6	0 28 31	0 29 47	0 31 4	0 32 24	0 33 46	0 35 8	0 36 34	0 38 3	0 39 34	0 41 8	0 42 44	0 44 22	0 46 3	0 47 46	0 49 31
7	0 28 14	0 29 29	0 30 45	0 32 4	0 33 25	0 34 47	0 36 12	0 37 40	0 39 10	0 40 43	0 42 17	0 43 54	0 45 34	0 47 16	0 49 0
8	0 27 57	0 29 11	0 30 26	0 31 44	0 33 4	0 34 26	0 35 50	0 37 17	0 38 46	0 40 18	0 41 51	0 43 27	0 45 5	0 46 47	0 48 29
9	0 27 40	0 28 52	0 30 7	0 31 24	0 32 43	0 34 5	0 35 28	0 36 54	0 38 22	0 39 53	0 41 25	0 43 0	0 44 37	0 46 18	0 47 59
10	0 27 23	0 28 34	0 29 48	0 31 5	0 32 23	0 33 44	0 35 6	0 36 31	0 37 58	0 39 28	0 41 0	0 42 33	0 44 9	0 45 49	0 47 30
11	0 27 6	0 28 16	0 29 29	0 30 45	0 32 3	0 33 23	0 34 44	0 36 8	0 37 34	0 39 4	0 40 35	0 42 7	0 43 42	0 45 21	0 47 1
12	0 26 49	0 27 58	0 29 10	0 30 25	0 31 42	0 33 1	0 34 22	0 35 45	0 37 11	0 38 40	0 40 10	0 41 41	0 43 15	0 44 53	0 46 32
13	0 26 28	0 27 36	0 28 45	0 30 1	0 31 18	0 32 36	0 33 57	0 35 19	0 36 44	0 38 11	0 39 40	0 41 11	0 42 44	0 44 21	0 45 59
14	0 26 6	0 27 14	0 28 24	0 29 37	0 30 53	0 32 11	0 33 31	0 34 53	0 36 17	0 37 42	0 39 10	0 40 41	0 42 13	0 43 49	0 45 25
15	0 25 44	0 26 51	0 28 1	0 29 13	0 30 28	0 31 46	0 33 5	0 34 26	0 35 49	0 37 13	0 38 40	0 40 10	0 41 42	0 43 16	0 44 51
16	0 25 22	0 26 28	0 27 37	0 28 48	0 30 2	0 31 19	0 32 38	0 33 59	0 35 21	0 36 44	0 38 10	0 39 39	0 41 10	0 42 43	0 44 17
17	0 25 0	0 26 5	0 27 13	0 28 23	0 29 36	0 30 52	0 32 10	0 33 30	0 34 51	0 36 14	0 37 39	0 39 7	0 40 37	0 42 9	0 43 43
18	0 24 37	0 25 42	0 26 49	0 27 58	0 29 10	0 30 24	0 31 40	0 32 59	0 34 20	0 35 43	0 37 8	0 38 34	0 40 2	0 41 33	0 43 7
19	0 24 10	0 25 15	0 26 21	0 27 30	0 28 42	0 29 54	0 31 9	0 32 27	0 33 47	0 35 10	0 36 34	0 37 59	0 39 25	0 40 55	0 42 29
20	0 23 40	0 24 41	0 25 50	0 26 59	0 28 10	0 29 22	0 30 36	0 31 53	0 33 12	0 34 34	0 35 57	0 37 21	0 38 46	0 40 15	0 41 48
21	0 23 6	0 24 9	0 25 15	0 26 24	0 27 35	0 28 47	0 30 1	0 31 16	0 32 34	0 33 55	0 35 17	0 36 41	0 38 6	0 39 33	0 41 4
22	0 22 29	0 23 32	0 24 37	0 25 45	0 26 55	0 28 7	0 29 21	0 30 35	0 31 52	0 33 12	0 34 33	0 35 56	0 37 21	0 38 48	0 40 17
23	0 21 47	0 22 50	0 23 55	0 25 2	0 26 10	0 27 20	0 28 32	0 29 47	0 31 4	0 32 23	0 33 44	0 35 6	0 36 30	0 37 57	0 39 25

LATITUDE 57° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 54 33	0 56 29	0 58 29	1 0 30	1 2 35	1 4 41	1 6 50	1 9 1	1 11 15	1 13 31	1 15 50	1 18 10	1 20 34	1 22 59	1 25 27
1	0 55 6	0 57 4	0 59 4	1 1 7	1 3 14	1 5 21	1 7 31	1 9 43	1 11 59	1 14 16	1 16 36	1 18 58	1 21 23	1 23 50	1 26 20
2	0 55 39	0 57 39	0 59 40	1 1 45	1 3 53	1 6 2	1 8 13	1 10 27	1 12 44	1 15 2	1 17 24	1 19 48	1 22 15	1 24 43	1 27 14
3	0 56 13	0 58 14	1 0 16	1 2 23	1 4 33	1 6 44	1 8 56	1 11 12	1 13 31	1 15 50	1 18 13	1 20 39	1 23 8	1 25 37	1 28 10
4	0 56 48	0 58 50	1 0 53	1 3 3	1 5 14	1 7 27	1 9 40	1 11 58	1 14 18	1 16 39	1 19 3	1 21 31	1 24 2	1 26 31	1 29 8
5	0 57 24	0 59 27	1 1 31	1 3 44	1 5 55	1 8 10	1 10 25	1 12 40	1 15 6	1 17 29	1 19 55	1 22 24	1 24 55	1 27 26	1 30 7
6	0 58 1	1 0 5	1 2 11	1 4 25	1 6 37	1 8 54	1 11 11	1 13 33	1 15 55	1 18 20	1 20 48	1 23 17	1 25 50	1 28 23	1 31 6
7	0 58 39	1 0 44	1 2 52	1 5 7	1 7 21	1 9 39	1 11 58	1 14 21	1 16 45	1 19 12	1 21 42	1 24 12	1 26 47	1 29 22	1 32 6
8	0 59 17	1 1 24	1 3 34	1 5 50	1 8 6	1 10 25	1 12 46	1 15 10	1 17 36	1 20 5	1 22 37	1 25 9	1 27 46	1 30 23	1 33 8
9	0 59 56	1 2 5	1 4 18	1 6 34	1 8 52	1 11 12	1 13 35	1 16 0	1 18 28	1 20 59	1 23 33	1 26 8	1 28 46	1 31 26	1 34 12
10	1 0 37	1 2 48	1 5 3	1 7 19	1 9 39	1 12 1	1 14 24	1 16 51	1 19 21	1 21 54	1 24 30	1 27 8	1 29 48	1 32 31	1 35 17
11	1 1 19	1 3 33	1 5 50	1 8 6	1 10 28	1 12 52	1 15 15	1 17 44	1 20 16	1 22 51	1 25 29	1 28 10	1 30 52	1 33 37	1 36 24
12	1 2 2	1 4 19	1 6 39	1 8 55	1 11 19	1 13 45	1 16 8	1 18 39	1 21 13	1 23 50	1 26 30	1 29 14	1 31 58	1 34 45	1 37 34
13	1 2 46	1 5 6	1 7 30	1 9 46	1 12 12	1 14 40	1 17 3	1 19 36	1 22 12	1 24 51	1 27 33	1 30 20	1 33 6	1 35 55	1 38 47
14	1 3 31	1 5 54	1 8 22	1 10 39	1 13 6	1 15 37	1 18 0	1 20 35	1 23 13	1 25 53	1 28 38	1 31 28	1 34 16	1 37 7	1 40 2
15	1 4 18	1 6 43	1 9 14	1 11 33	1 14 1	1 16 35	1 18 59	1 21 36	1 24 17	1 26 58	1 29 45	1 32 39	1 35 29	1 38 22	1 41 20
16	1 5 7	1 7 34	1 10 6	1 12 28	1 14 58	1 17 33	1 20 0	1 22 41	1 25 23	1 28 7	1 30 56	1 34 52	1 36 44	1 39 39	1 42 40
17	1 5 58	1 8 26	1 10 59	1 13 24	1 15 56	1 18 32	1 21 3	1 23 48	1 26 32	1 29 19	1 32 10	1 35 7	1 38 2	1 40 59	1 44 2
18	1 6 51	1 9 20	1 11 53	1 14 22	1 16 55	1 19 33	1 22 9	1 24 57	1 27 43	1 30 33	1 33 26	1 36 24	1 39 22	1 42 21	1 45 26
19	1 7 45	1 10 15	1 12 49	1 15 22	1 17 57	1 20 36	1 23 17	1 26 7	1 28 57	1 31 49	1 34 44	1 37 43	1 40 44	1 43 46	1 46 53
20	1 8 41	1 11 11	1 13 47	1 16 24	1 19 1	1 21 41	1 24 27	1 27 19	1 30 13	1 33 7	1 36 4	1 39 4	1 42 7	1 45 13	1 48 23
21	1 9 39	1 12 12	1 14 49	1 17 29	1 20 8	1 22 50	1 25 39	1 28 35	1 31 32	1 34 37	1 37 27	1 40 29	1 43 34	1 46 43	1 49 57
22	1 10 41	1 13 16	1 15 55	1 18 38	1 21 19	1 24 4	1 26 57	1 29 56	1 32 54	1 35 59	1 38 56	1 42 1	1 45 9	1 48 21	1 51 38
23	1 11 47	1 14 25	1 17 7	1 19 51	1 22 36	1 25 26	1 28 23	1 31 22	1 34 22	1 37 25	1 40 32	1 43 42	1 46 54	1 50 9	1 53 28

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 54 33	0 56 29	0 58 29	1 0 30	1 2 35	1 4 41	1 6 50	1 9 1	1 11 15	1 13 31	1 15 50	1 18 10	1 20 34	1 22 59	1 25 27
1	0 54 0	0 55 55	0 57 53	0 59 53	1 1 56	1 4 2	1 6 11	1 8 23	1 10 36	1 12 51	1 15 8	1 17 26	1 19 47	1 22 8	1 24 35
2	0 53 27	0 55 21	0 57 17	0 59 16	1 1 18	1 3 23	1 5 32	1 7 45	1 9 57	1 12 10	1 14 25	1 16 41	1 18 59	1 21 18	1 23 43
3	0 52 54	0 54 47	0 56 42	0 58 39	1 0 40	1 2 45	1 4 54	1 7 6	1 9 17	1 11 29	1 13 42	1 15 56	1 18 11	1 20 28	1 22 51
4	0 52 22	0 54 13	0 56 8	0 58 4	1 0 3	1 2 7	1 4 14	1 6 24	1 8 33	1 10 45	1 12 57	1 15 9	1 17 23	1 19 39	1 22 1
5	0 51 50	0 53 40	0 55 34	0 57 29	0 59 26	1 1 29	1 3 34	1 5 42	1 7 49	1 10 1	1 12 11	1 14 22	1 16 35	1 18 50	1 21 11
6	0 51 18	0 53 7	0 55 0	0 56 54	0 58 50	1 0 51	1 2 54	1 5 0	1 7 6	1 9 16	1 11 25	1 13 35	1 15 47	1 18 1	1 20 21
7	0 50 46	0 52 34	0 54 26	0 56 19	0 58 14	1 0 13	1 2 14	1 4 18	1 6 23	1 8 31	1 10 39	1 12 48	1 14 59	1 17 13	1 19 31
8	0 50 14	0 52 1	0 53 52	0 55 44	0 57 38	0 59 35	1 1 34	1 3 36	1 5 40	1 7 46	1 9 53	1 12 1	1 14 11	1 16 35	1 18 42
9	0 49 42	0 51 28	0 53 18	0 55 9	0 57 2	0 58 57	1 0 54	1 2 54	1 4 57	1 7 1	1 9 7	1 11 14	1 13 24	1 15 37	1 17 53
10	0 49 12	0 50 57	0 52 45	0 54 35	0 56 27	0 58 21	1 0 17	1 2 15	1 4 17	1 6 19	1 8 24	1 10 30	1 12 39	1 14 51	1 17 6
11	0 48 42	0 50 26	0 52 12	0 54 1	0 55 52	0 57 45	0 59 40	1 1 37	1 3 37	1 5 38	1 7 41	1 9 46	1 11 54	1 14 5	1 16 19
12	0 48 12	0 49 55	0 51 40	0 53 27	0 55 18	0 57 10	0 59 3	1 0 59	1 2 57	1 4 57	1 6 59	1 9 3	1 11 10	1 13 19	1 15 32
13	0 47 39	0 49 20	0 51 4	0 52 51	0 54 40	0 56 30	0 58 23	1 0 18	1 2 14	1 4 13	1 6 14	1 8 18	1 10 23	1 12 32	1 14 44
14	0 47 3	0 48 44	0 50 28	0 52 14	0 54 1	0 55 50	0 57 42	0 59 36	1 1 31	1 3 28	1 5 29	1 7 32	1 9 35	1 11 44	1 13 55
15	0 46 28	0 48 8	0 49 52	0 51 36	0 53 21	0 55 9	0 57 1	0 58 54	1 0 47	1 2 43	1 4 43	1 6 45	1 8 48	1 10 55	1 13 6
16	0 45 53	0 47 32	0 49 15	0 50 58	0 52 42	0 54 28	0 56 19	0 58 12	1 0 3	1 1 59	1 3 57	1 5 58	1 7 59	1 10 5	1 12 12
17	0 45 18	0 46 56	0 48 37	0 50 19	0 52 2	0 53 47	0 55 36	0 57 28	0 59 19	1 1 14	1 3 11	1 5 10	1 7 9	1 9 13	1 11 18
18	0 44 43	0 46 20	0 47 58	0 49 39	0 51 22	0 53 6	0 54 52	0 56 42	0 58 35	1 0 29	1 2 24	1 4 20	1 6 19	1 8 20	1 10 24
19	0 44 5	0 45 41	0 47 17	0 48 57	0 50 39	0 52 23	0 54 8	0 55 56	0 57 47	0 59 40	1 1 33	1 3 29	1 5 26	1 7 26	1 9 29
20	0 43 23	0 44 58	0 46 33	0 48 12	0 49 53	0 51 37	0 53 22	0 55 8	0 56 57	0 58 49	1 0 39	1 2 36	1 4 32	1 6 30	1 8 33
21	0 42 38	0 44 12	0 45 46	0 47 24	0 49 5	0 50 48	0 52 32	0 54 18	0 56 5	0 57 55	0 59 47	1 1 41	1 3 35	1 5 32	1 7 34
22	0 41 49	0 43 22	0 44 56	0 46 33	0 48 13	0 49 54	0 51 36	0 53 23	0 55 10	0 56 58	0 58 49	1 0 42	1 2 34	1 4 30	1 6 31
23	0 40 55	0 42 27	0 44 2	0 45 38	0 47 14	0 48 54	0 50 37	0 52 22	0 54 8	0 55 56	0 57 45	0 59 36	1 1 29	1 3 24	1 5 22

LATITUDE 58° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 9 53	0 9 57	0 10 3	0 10 11	0 10 23	0 10 36	0 10 52	0 11 11	0 11 31	0 11 55	0 12 20	0 12 49	0 13 19	0 13 52	0 14 28
1	0 9 56	0 10 0	0 10 6	0 10 15	0 10 27	0 10 40	0 10 56	0 11 14	0 11 34	0 11 58	0 12 25	0 12 54	0 13 25	0 13 58	0 14 35
2	0 9 59	0 10 3	0 10 9	0 10 18	0 10 31	0 10 44	0 11 0	0 11 17	0 11 37	0 12 1	0 12 30	0 12 59	0 13 31	0 14 4	0 14 41
3	0 10 2	0 10 6	0 10 11	0 10 21	0 10 35	0 10 48	0 11 4	0 11 20	0 11 40	0 12 4	0 12 35	0 13 4	0 13 37	0 14 10	0 14 47
4	0 10 5	0 10 9	0 10 16	0 10 24	0 10 38	0 10 52	0 11 8	0 11 23	0 11 43	0 12 7	0 12 39	0 13 9	0 13 43	0 14 16	0 14 53
5	0 10 8	0 10 12	0 10 19	0 10 27	0 10 41	0 10 56	0 11 11	0 11 26	0 11 46	0 12 11	0 12 43	0 13 14	0 13 48	0 14 22	0 14 59
6	0 10 11	0 10 15	0 10 22	0 10 30	0 10 44	0 10 59	0 11 14	0 11 29	0 11 49	0 12 15	0 12 47	0 13 19	0 13 53	0 14 28	0 15 5
7	0 10 14	0 10 18	0 10 25	0 10 33	0 10 47	0 11 2	0 11 17	0 11 32	0 11 52	0 12 19	0 12 51	0 13 24	0 13 58	0 14 34	0 15 11
8	0 10 16	0 10 21	0 10 28	0 10 36	0 10 50	0 11 5	0 11 20	0 11 35	0 11 55	0 12 23	0 12 55	0 13 29	0 14 3	0 14 40	0 15 17
9	0 10 18	0 10 23	0 10 31	0 10 39	0 10 53	0 11 8	0 11 23	0 11 38	0 11 59	0 12 27	0 12 59	0 13 34	0 14 8	0 14 45	0 15 23
10	0 10 20	0 10 25	0 10 34	0 10 42	0 10 56	0 11 11	0 11 26	0 11 41	0 12 3	0 12 31	0 13 3	0 13 38	0 14 13	0 14 50	0 15 29
11	0 10 22	0 10 27	0 10 36	0 10 45	0 10 59	0 11 14	0 11 29	0 11 44	0 12 7	0 12 35	0 13 7	0 13 42	0 14 18	0 14 55	0 15 35
12	0 10 24	0 10 29	0 10 38	0 10 48	0 11 2	0 11 17	0 11 32	0 11 48	0 12 11	0 12 39	0 13 11	0 13 46	0 14 23	0 15 0	0 15 41
13	0 10 26	0 10 31	0 10 40	0 10 50	0 11 4	0 11 19	0 11 35	0 11 52	0 12 15	0 12 43	0 13 15	0 13 50	0 14 28	0 15 5	0 15 47
14	0 10 28	0 10 33	0 10 42	0 10 52	0 11 6	0 11 21	0 11 37	0 11 56	0 12 20	0 12 47	0 13 20	0 13 55	0 14 33	0 15 11	0 15 53
15	0 10 30	0 10 35	0 10 44	0 10 54	0 11 8	0 11 23	0 11 39	0 12 0	0 12 25	0 12 52	0 13 25	0 14 0	0 14 38	0 15 17	0 15 59
16	0 10 32	0 10 37	0 10 46	0 10 56	0 11 10	0 11 25	0 11 41	0 12 4	0 12 30	0 12 57	0 13 30	0 14 5	0 14 43	0 15 23	0 16 5
17	0 10 34	0 10 39	0 10 48	0 10 58	0 11 12	0 11 27	0 11 44	0 12 8	0 12 35	0 13 2	0 13 35	0 14 10	0 14 48	0 15 29	0 16 11
18	0 10 36	0 10 41	0 10 50	0 11 0	0 11 14	0 11 29	0 11 47	0 12 12	0 12 39	0 13 7	0 13 40	0 14 15	0 14 53	0 15 35	0 16 17
19	0 10 37	0 10 43	0 10 50	0 11 2	0 11 16	0 11 31	0 11 50	0 12 16	0 12 43	0 13 12	0 13 45	0 14 20	0 14 58	0 15 41	0 16 24
20	0 10 38	0 10 45	0 10 51	0 11 4	0 11 18	0 11 33	0 11 53	0 12 19	0 12 47	0 13 17	0 13 50	0 14 25	0 15 3	0 15 47	0 16 31
21	0 10 40	0 10 45	0 10 51	0 11 6	0 11 21	0 11 36	0 11 56	0 12 22	0 12 51	0 13 22	0 13 55	0 14 30	0 15 9	0 15 52	0 16 39
22	0 10 41	0 10 46	0 10 51	0 11 7	0 11 23	0 11 40	0 12 0	0 12 25	0 12 54	0 13 27	0 14 0	0 14 35	0 15 16	0 16 2	0 16 48
23	0 10 42	0 10 46	0 10 52	0 11 8	0 11 25	0 11 43	0 12 4	0 12 28	0 12 57	0 13 31	0 14 5	0 14 41	0 15 23	0 16 8	0 16 57

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 9 53	0 9 59	0 10 3	0 10 11	0 10 23	0 10 36	0 10 52	0 11 11	0 11 31	0 11 55	0 12 20	0 12 49	0 13 19	0 13 52	0 14 28
1	0 9 47	0 9 52	0 9 57	0 10 5	0 10 17	0 10 30	0 10 46	0 11 4	0 11 24	0 11 47	0 12 12	0 12 41	0 13 11	0 13 44	0 14 20
2	0 9 41	0 9 47	0 9 51	0 9 59	0 10 11	0 10 24	0 10 40	0 10 57	0 11 17	0 11 39	0 12 4	0 12 33	0 13 3	0 13 36	0 14 11
3	0 9 35	0 9 41	0 9 45	0 9 53	0 10 5	0 10 18	0 10 33	0 10 50	0 11 10	0 11 32	0 11 56	0 12 25	0 12 55	0 13 28	0 14 2
4	0 9 29	0 9 35	0 9 39	0 9 46	0 9 58	0 10 11	0 10 26	0 10 43	0 11 3	0 11 25	0 11 49	0 12 17	0 12 47	0 13 19	0 13 53
5	0 9 23	0 9 29	0 9 33	0 9 39	0 9 51	0 10 4	0 10 19	0 10 36	0 10 56	0 11 18	0 11 42	0 12 9	0 12 38	0 13 10	0 13 44
6	0 9 17	0 9 23	0 9 27	0 9 33	0 9 45	0 9 58	0 10 13	0 10 29	0 10 49	0 11 11	0 11 35	0 12 1	0 12 30	0 13 2	0 13 36
7	0 9 11	0 9 17	0 9 21	0 9 27	0 9 39	0 9 52	0 10 6	0 10 22	0 10 42	0 11 4	0 11 28	0 11 53	0 12 22	0 12 54	0 13 28
8	0 9 5	0 9 10	0 9 15	0 9 21	0 9 33	0 9 45	0 9 59	0 10 15	0 10 35	0 10 57	0 11 20	0 11 45	0 12 14	0 12 46	0 13 19
9	0 8 59	0 9 3	0 9 9	0 9 15	0 9 26	0 9 38	0 9 52	0 10 8	0 10 28	0 10 50	0 11 12	0 11 37	0 12 6	0 12 38	0 13 10
10	0 8 52	0 8 56	0 9 2	0 9 9	0 9 19	0 9 31	0 9 45	0 10 1	0 10 21	0 10 42	0 11 4	0 11 29	0 11 58	0 12 29	0 13 1
11	0 8 44	0 8 48	0 8 54	0 9 1	0 9 11	0 9 23	0 9 37	0 9 53	0 10 13	0 10 34	0 10 56	0 11 21	0 11 49	0 12 20	0 12 51
12	0 8 35	0 8 39	0 8 45	0 8 52	0 9 2	0 9 14	0 9 28	0 9 44	0 10 4	0 10 25	0 10 47	0 11 11	0 11 39	0 12 9	0 12 40
13	0 8 25	0 8 29	0 8 35	0 8 42	0 8 52	0 9 4	0 9 18	0 9 34	0 9 53	0 10 15	0 10 37	0 11 0	0 11 28	0 11 57	0 12 28
14	0 8 15	0 8 18	0 8 25	0 8 32	0 8 41	0 8 53	0 9 8	0 9 23	0 9 41	0 10 3	0 10 25	0 10 48	0 11 15	0 11 44	0 12 15
15	0 8 3	0 8 7	0 8 14	0 8 20	0 8 29	0 8 41	0 8 54	0 9 10	0 9 28	0 9 50	0 10 12	0 10 35	0 11 1	0 11 30	0 12 0
16	0 7 50	0 7 54	0 8 1	0 8 7	0 8 16	0 8 27	0 8 40	0 8 57	0 9 14	0 9 36	0 9 58	0 10 21	0 10 47	0 11 14	0 11 42
17	0 7 35	0 7 40	0 7 46	0 7 52	0 8 1	0 8 12	0 8 25	0 8 42	0 8 59	0 9 20	0 9 42	0 10 5	0 10 31	0 10 56	0 11 22
18	0 7 18	0 7 23	0 7 29	0 7 35	0 7 44	0 7 55	0 8 8	0 8 25	0 8 42	0 9 2	0 9 23	0 9 46	0 10 12	0 10 36	0 11 1
19	0 6 59	0 7 4	0 7 10	0 7 16	0 7 25	0 7 36	0 7 49	0 8 5	0 8 22	0 8 42	0 9 2	0 9 25	0 9 51	0 10 14	0 10 38
20	0 6 38	0 6 42	0 6 47	0 6 55	0 7 4	0 7 14	0 7 27	0 7 42	0 7 59	0 8 18	0 8 38	0 9 1	0 9 27	0 9 49	0 10 12
21	0 6 12	0 6 16	0 6 22	0 6 29	0 6 39	0 6 49	0 7 2	0 7 16	0 7 33	0 7 52	0 8 12	0 8 34	0 9 0	0 9 24	0 9 44
22	0 5 41	0 5 44	0 5 51	0 5 58	0 6 8	0 6 18	0 6 31	0 6 45	0 7 2	0 7 21	0 7 41	0 8 2	0 8 28	0 8 53	0 9 14
23	0 5 3	0 5 5	0 5 13	0 5 19	0 5 29	0 5 39	0 5 51	0 6 5	0 6 22	0 6 41	0 7 1	0 7 22	0 7 47	0 8 14	0 8 32

LATITUDE 58° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 15 6	0 15 46	0 16 29	0 17 14	0 18 2	0 18 52	0 19 45	0 20 40	0 21 37	0 22 37	0 23 39	0 24 44	0 25 51	0 27 1	0 28 13
1	0 15 13	0 15 53	0 16 36	0 17 22	0 18 10	0 19 1	0 19 55	0 20 50	0 21 48	0 22 49	0 23 51	0 24 57	0 26 5	0 27 16	0 28 29
2	0 15 20	0 16 0	0 16 43	0 17 30	0 18 18	0 19 10	0 20 5	0 21 0	0 21 59	0 23 1	0 24 3	0 25 10	0 26 19	0 27 31	0 28 45
3	0 15 27	0 16 7	0 16 51	0 17 38	0 18 27	0 19 19	0 20 15	0 21 10	0 22 10	0 23 13	0 24 15	0 25 23	0 26 33	0 27 46	0 29 1
4	0 15 34	0 16 14	0 16 59	0 17 46	0 18 36	0 19 28	0 20 25	0 21 21	0 22 21	0 23 25	0 24 27	0 25 37	0 26 48	0 28 1	0 29 17
5	0 15 41	0 16 21	0 17 7	0 17 54	0 18 45	0 19 37	0 20 35	0 21 32	0 22 32	0 23 37	0 24 40	0 25 51	0 27 3	0 28 16	0 29 33
6	0 15 47	0 16 28	0 17 15	0 18 2	0 18 54	0 19 46	0 20 45	0 21 43	0 22 43	0 23 49	0 24 53	0 26 5	0 27 18	0 28 32	0 29 49
7	0 15 53	0 16 35	0 17 23	0 18 10	0 19 3	0 19 56	0 20 55	0 21 53	0 22 55	0 24 1	0 25 6	0 26 19	0 27 33	0 28 48	0 30 5
8	0 15 59	0 16 42	0 17 31	0 18 18	0 19 12	0 20 6	0 21 5	0 22 5	0 23 7	0 24 13	0 25 20	0 26 33	0 27 48	0 29 4	0 30 22
9	0 16 5	0 16 49	0 17 38	0 18 27	0 19 21	0 20 16	0 21 15	0 22 16	0 23 19	0 24 25	0 25 34	0 26 47	0 28 3	0 29 20	0 30 39
10	0 16 11	0 16 56	0 17 45	0 18 36	0 19 30	0 20 26	0 21 25	0 22 27	0 23 31	0 24 38	0 25 48	0 27 1	0 28 18	0 29 36	0 30 56
11	0 16 17	0 17 3	0 17 53	0 18 45	0 19 40	0 20 36	0 21 36	0 22 39	0 23 44	0 24 52	0 26 3	0 27 16	0 28 34	0 29 53	0 31 14
12	0 16 23	0 17 10	0 18 1	0 18 54	0 19 50	0 20 46	0 21 47	0 22 51	0 23 57	0 25 6	0 26 18	0 27 32	0 28 50	0 30 10	0 31 32
13	0 16 29	0 17 17	0 18 9	0 19 3	0 20 0	0 20 57	0 21 58	0 23 3	0 24 10	0 25 20	0 26 34	0 27 49	0 29 7	0 30 28	0 31 51
14	0 16 35	0 17 24	0 18 17	0 19 12	0 20 10	0 21 8	0 22 9	0 23 15	0 24 24	0 25 35	0 26 50	0 28 6	0 29 25	0 30 46	0 32 10
15	0 16 42	0 17 31	0 18 26	0 19 21	0 20 20	0 21 19	0 22 20	0 23 28	0 24 38	0 25 50	0 27 6	0 28 23	0 29 43	0 31 4	0 32 29
16	0 16 49	0 17 38	0 18 35	0 19 30	0 20 30	0 21 30	0 22 32	0 23 41	0 24 52	0 26 5	0 27 22	0 28 40	0 30 1	0 31 23	0 32 49
17	0 16 56	0 17 45	0 18 44	0 19 40	0 20 40	0 21 41	0 22 44	0 23 54	0 25 6	0 26 20	0 27 38	0 28 57	0 30 19	0 31 42	0 33 10
18	0 17 3	0 17 53	0 18 53	0 19 50	0 20 50	0 21 52	0 22 56	0 24 7	0 25 20	0 26 35	0 27 54	0 29 14	0 30 37	0 32 2	0 33 32
19	0 17 10	0 18 2	0 19 2	0 20 0	0 21 0	0 22 3	0 23 9	0 24 20	0 25 34	0 26 50	0 28 10	0 29 32	0 30 56	0 32 23	0 33 55
20	0 17 17	0 18 9	0 19 11	0 20 10	0 21 11	0 22 14	0 23 22	0 24 33	0 25 48	0 27 5	0 28 27	0 29 51	0 31 17	0 32 45	0 34 18
21	0 17 27	0 18 20	0 19 21	0 20 21	0 21 23	0 22 27	0 23 36	0 24 47	0 26 2	0 27 21	0 28 44	0 30 11	0 31 39	0 33 8	0 34 43
22	0 17 38	0 18 32	0 19 32	0 20 32	0 21 35	0 22 41	0 23 51	0 25 3	0 26 19	0 27 40	0 29 4	0 30 32	0 32 2	0 33 33	0 35 9
23	0 17 49	0 18 44	0 19 43	0 20 44	0 21 48	0 22 56	0 24 7	0 25 22	0 26 40	0 28 2	0 29 25	0 30 53	0 32 25	0 33 59	0 35 35

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 15 6	0 15 46	0 16 29	0 17 14	0 18 2	0 18 52	0 19 45	0 20 40	0 21 37	0 22 37	0 23 39	0 24 44	0 25 51	0 27 1	0 28 13
1	0 14 56	0 15 36	0 16 18	0 17 3	0 17 51	0 18 40	0 19 32	0 20 27	0 21 23	0 22 23	0 23 25	0 24 29	0 25 35	0 26 44	0 27 55
2	0 14 47	0 15 26	0 16 8	0 16 52	0 17 40	0 18 28	0 19 20	0 20 14	0 21 10	0 22 9	0 23 11	0 24 14	0 25 19	0 26 27	0 27 38
3	0 14 38	0 15 16	0 15 58	0 16 42	0 17 29	0 18 16	0 19 8	0 20 1	0 20 57	0 21 55	0 22 56	0 23 59	0 25 3	0 26 10	0 27 21
4	0 14 29	0 15 7	0 15 48	0 16 32	0 17 18	0 18 5	0 18 56	0 19 48	0 20 44	0 21 41	0 22 41	0 23 43	0 24 47	0 25 54	0 27 4
5	0 14 20	0 14 58	0 15 38	0 16 21	0 17 6	0 17 54	0 18 44	0 19 36	0 20 31	0 21 28	0 22 26	0 23 27	0 24 31	0 25 38	0 26 47
6	0 14 11	0 14 49	0 15 28	0 16 11	0 16 56	0 17 43	0 18 33	0 19 23	0 20 18	0 21 15	0 22 15	0 23 12	0 24 16	0 25 22	0 26 30
7	0 14 2	0 14 40	0 15 18	0 16 1	0 16 45	0 17 32	0 18 22	0 19 12	0 20 5	0 21 2	0 22 3	0 22 58	0 24 1	0 25 6	0 26 13
8	0 13 53	0 14 30	0 15 8	0 15 51	0 16 34	0 17 21	0 18 10	0 19 0	0 19 52	0 20 48	0 21 49	0 22 44	0 23 46	0 24 50	0 25 56
9	0 13 44	0 14 20	0 14 58	0 15 40	0 16 23	0 17 10	0 17 58	0 18 48	0 19 39	0 20 34	0 21 34	0 22 30	0 23 31	0 24 34	0 25 39
10	0 13 35	0 14 10	0 14 47	0 15 29	0 16 12	0 16 58	0 17 46	0 18 35	0 19 26	0 20 20	0 21 17	0 22 16	0 23 16	0 24 19	0 25 23
11	0 13 25	0 13 59	0 14 37	0 15 18	0 16 1	0 16 46	0 17 34	0 18 22	0 19 12	0 20 6	0 21 4	0 22 2	0 23 2	0 24 4	0 25 8
12	0 13 14	0 13 49	0 14 26	0 15 6	0 15 49	0 16 33	0 17 21	0 18 8	0 18 57	0 19 51	0 20 49	0 21 47	0 22 47	0 23 48	0 24 52
13	0 13 2	0 13 37	0 14 14	0 14 53	0 15 35	0 16 19	0 17 7	0 17 53	0 18 41	0 19 35	0 20 32	0 21 30	0 22 30	0 23 30	0 24 33
14	0 12 48	0 13 23	0 14 0	0 14 38	0 15 20	0 16 4	0 16 51	0 17 37	0 18 25	0 19 18	0 20 13	0 21 11	0 22 10	0 23 10	0 24 12
15	0 12 33	0 13 8	0 13 44	0 14 22	0 15 3	0 15 47	0 16 33	0 17 19	0 18 7	0 18 58	0 19 53	0 20 49	0 21 47	0 22 46	0 23 48
16	0 12 16	0 12 52	0 13 27	0 14 5	0 14 46	0 15 29	0 16 15	0 17 0	0 17 48	0 18 38	0 19 32	0 20 27	0 21 24	0 22 22	0 23 24
17	0 11 57	0 12 34	0 13 9	0 13 47	0 14 27	0 15 9	0 15 55	0 16 40	0 17 27	0 18 16	0 19 10	0 20 4	0 21 0	0 21 57	0 22 59
18	0 11 36	0 12 14	0 12 49	0 13 27	0 14 6	0 14 48	0 15 32	0 16 17	0 17 4	0 17 53	0 18 46	0 19 40	0 20 35	0 21 31	0 22 32
19	0 11 13	0 11 52	0 12 27	0 13 4	0 13 43	0 14 25	0 15 8	0 15 53	0 16 40	0 17 29	0 18 21	0 19 14	0 20 9	0 21 5	0 22 4
20	0 10 48	0 11 27	0 12 2	0 12 39	0 13 18	0 13 59	0 14 42	0 15 27	0 16 14	0 17 3	0 17 54	0 18 47	0 19 41	0 20 37	0 21 35
21	0 10 23	0 10 59	0 11 34	0 12 10	0 12 49	0 13 30	0 14 13	0 14 58	0 15 44	0 16 32	0 17 23	0 18 15	0 19 9	0 20 5	0 21 2
22	0 9 52	0 10 26	0 11 0	0 11 35	0 12 14	0 12 55	0 13 37	0 14 22	0 15 7	0 15 55	0 16 45	0 17 37	0 18 31	0 19 27	0 20 24
23	0 9 12	0 9 44	0 10 18	0 10 53	0 11 30	0 12 10	0 12 52	0 13 37	0 14 22	0 15 9	0 15 58	0 16 49	0 17 44	0 18 38	0 19 35

LATITUDE 58° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 29 27	0 30 44	0 32 3	0 33 25	0 34 48	0 36 15	0 37 44	0 39 15	0 40 48	0 42 24	0 44 3	0 45 43	0 47 26	0 49 11	0 50 59
1	0 29 44	0 31 1	0 32 20	0 33 43	0 35 8	0 36 36	0 38 6	0 39 38	0 41 11	0 42 48	0 44 28	0 46 9	0 47 53	0 49 39	0 51 28
2	0 30 1	0 31 18	0 32 38	0 34 4	0 35 28	0 36 57	0 38 28	0 40 2	0 41 35	0 43 13	0 44 54	0 46 36	0 48 21	0 50 8	0 51 58
3	0 30 18	0 31 35	0 32 57	0 34 23	0 35 48	0 37 18	0 38 51	0 40 26	0 42 0	0 43 39	0 45 21	0 47 4	0 48 50	0 50 38	0 52 29
4	0 30 35	0 31 52	0 33 16	0 34 42	0 36 8	0 37 40	0 39 14	0 40 50	0 42 25	0 44 6	0 45 49	0 47 33	0 49 20	0 51 8	0 53 0
5	0 30 52	0 32 10	0 33 35	0 35 2	0 36 29	0 38 2	0 39 37	0 41 14	0 42 51	0 44 33	0 46 17	0 48 2	0 49 50	0 51 39	0 53 32
6	0 31 9	0 32 28	0 33 54	0 35 22	0 36 50	0 38 24	0 40 0	0 41 38	0 43 17	0 45 0	0 46 45	0 48 31	0 50 20	0 52 10	0 53 4
7	0 31 26	0 32 46	0 34 13	0 35 42	0 37 12	0 38 56	0 40 23	0 42 2	0 43 43	0 45 27	0 47 13	0 49 0	0 50 50	0 52 42	0 54 37
8	0 31 43	0 33 5	0 34 32	0 36 3	0 37 34	0 39 9	0 40 46	0 42 27	0 44 9	0 45 55	0 47 42	0 49 30	0 51 21	0 53 14	0 55 11
9	0 32 1	0 33 24	0 34 52	0 36 24	0 37 57	0 39 32	0 41 10	0 42 52	0 44 36	0 46 24	0 48 12	0 50 1	0 51 53	0 53 47	0 55 46
10	0 32 19	0 33 44	0 35 13	0 36 46	0 38 20	0 39 56	0 41 35	0 43 18	0 45 4	0 46 54	0 48 43	0 50 33	0 52 25	0 54 21	0 56 22
11	0 32 38	0 34 4	0 35 34	0 37 9	0 38 44	0 40 20	0 42 0	0 43 44	0 45 33	0 47 24	0 49 15	0 51 6	0 52 59	0 54 56	0 56 59
12	0 32 57	0 34 24	0 35 56	0 37 33	0 39 9	0 40 44	0 42 26	0 44 11	0 46 3	0 47 55	0 49 48	0 51 40	0 53 34	0 55 33	0 57 38
13	0 33 17	0 34 45	0 36 19	0 37 58	0 39 35	0 41 9	0 42 53	0 44 39	0 46 34	0 48 27	0 50 22	0 52 15	0 54 10	0 56 12	0 58 19
14	0 33 38	0 35 7	0 36 42	0 38 23	0 40 1	0 41 36	0 43 21	0 45 8	0 47 6	0 49 0	0 50 57	0 52 51	0 54 47	0 56 52	0 59 1
15	0 33 58	0 35 30	0 37 6	0 38 48	0 40 28	0 42 4	0 43 50	0 45 38	0 47 38	0 49 34	0 51 32	0 53 28	0 55 24	0 57 33	0 59 44
16	0 34 20	0 35 53	0 37 30	0 39 15	0 40 55	0 42 32	0 44 19	0 46 8	0 48 11	0 50 8	0 52 7	0 54 5	0 56 3	0 58 14	1 0 27
17	0 34 43	0 36 17	0 37 55	0 39 39	0 41 22	0 43 1	0 44 48	0 46 39	0 48 44	0 50 43	0 52 43	0 54 43	0 56 44	0 58 56	1 1 11
18	0 35 6	0 36 42	0 38 21	0 40 5	0 41 49	0 43 31	0 45 18	0 47 11	0 49 18	0 51 18	0 53 20	0 55 23	0 57 27	0 59 40	1 1 56
19	0 35 30	0 37 8	0 38 48	0 40 32	0 42 17	0 44 2	0 45 49	0 47 44	0 49 53	0 51 54	0 53 58	0 56 4	0 58 12	1 0 26	1 2 43
20	0 35 55	0 37 35	0 39 16	0 41 0	0 42 46	0 44 33	0 46 21	0 48 18	0 50 29	0 52 31	0 54 37	0 56 46	0 58 59	1 1 14	1 3 31
21	0 36 21	0 38 3	0 39 45	0 41 29	0 43 16	0 45 6	0 46 56	0 48 55	0 51 8	0 53 11	0 55 18	0 57 30	0 59 47	1 2 4	1 4 21
22	0 36 48	0 38 34	0 40 16	0 41 59	0 43 49	0 45 44	0 47 36	0 49 33	0 51 50	0 54 3	0 56 8	0 58 18	1 0 36	1 2 56	1 5 15
23	0 37 17	0 39 9	0 40 49	0 42 31	0 44 24	0 46 26	0 48 22	0 50 14	0 52 34	0 55 6	0 57 8	0 59 11	1 1 27	1 3 49	1 6 13

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 29 27	0 30 44	0 32 3	0 33 25	0 34 48	0 36 15	0 37 44	0 39 15	0 40 48	0 42 24	0 44 3	0 45 43	0 47 26	0 49 11	0 50 59
1	0 29 9	0 30 25	0 31 43	0 33 4	0 34 26	0 35 52	0 37 20	0 38 51	0 40 23	0 41 57	0 43 35	0 45 15	0 46 57	0 48 41	0 50 28
2	0 28 51	0 30 6	0 31 23	0 32 43	0 34 4	0 35 29	0 36 56	0 38 27	0 39 58	0 41 31	0 43 7	0 44 47	0 46 28	0 48 11	0 49 57
3	0 28 33	0 29 47	0 31 3	0 32 22	0 33 43	0 35 7	0 36 33	0 38 3	0 39 23	0 41 5	0 42 40	0 44 19	0 45 59	0 47 41	0 49 26
4	0 28 15	0 29 28	0 30 44	0 32 2	0 33 22	0 34 45	0 36 10	0 37 39	0 39 8	0 40 39	0 42 13	0 43 51	0 45 30	0 47 11	0 48 55
5	0 27 57	0 29 10	0 30 25	0 31 42	0 33 1	0 34 23	0 35 47	0 37 15	0 38 43	0 40 13	0 41 46	0 43 23	0 45 2	0 46 42	0 48 25
6	0 27 39	0 28 52	0 30 5	0 31 22	0 32 41	0 34 2	0 35 25	0 36 52	0 38 19	0 39 48	0 41 21	0 42 56	0 44 34	0 46 13	0 47 53
7	0 27 21	0 28 33	0 29 45	0 31 2	0 32 21	0 33 41	0 35 3	0 36 29	0 37 55	0 39 23	0 40 56	0 42 30	0 44 7	0 45 45	0 47 25
8	0 27 3	0 28 14	0 29 25	0 30 42	0 32 1	0 33 20	0 34 42	0 36 6	0 37 31	0 38 59	0 40 31	0 42 4	0 43 40	0 45 17	0 46 55
9	0 26 46	0 27 55	0 29 4	0 30 21	0 31 41	0 33 0	0 34 21	0 35 44	0 37 8	0 38 35	0 40 6	0 41 38	0 43 13	0 44 49	0 46 26
10	0 26 29	0 27 36	0 28 43	0 30 0	0 31 21	0 32 40	0 34 0	0 35 22	0 36 45	0 38 11	0 39 41	0 41 12	0 42 46	0 44 21	0 45 57
11	0 26 13	0 27 18	0 28 27	0 29 43	0 31 2	0 32 20	0 33 39	0 34 58	0 36 22	0 37 49	0 39 17	0 40 46	0 42 18	0 43 53	0 45 27
12	0 25 56	0 26 59	0 28 10	0 29 24	0 30 41	0 31 58	0 33 16	0 34 34	0 35 58	0 37 26	0 38 52	0 40 18	0 41 49	0 43 24	0 44 57
13	0 25 37	0 26 40	0 27 52	0 29 3	0 30 18	0 31 35	0 32 52	0 34 9	0 35 34	0 37 2	0 38 26	0 39 49	0 41 19	0 42 53	0 44 26
14	0 25 16	0 26 20	0 27 31	0 28 40	0 29 54	0 31 11	0 32 27	0 33 43	0 35 8	0 36 37	0 37 58	0 39 19	0 40 48	0 42 21	0 43 54
15	0 24 52	0 25 58	0 27 6	0 28 15	0 29 28	0 30 45	0 32 0	0 33 15	0 34 41	0 36 10	0 37 29	0 38 48	0 40 16	0 41 48	0 43 21
16	0 24 27	0 25 33	0 26 40	0 27 48	0 29 1	0 30 16	0 31 31	0 32 46	0 34 10	0 35 37	0 36 57	0 38 16	0 39 44	0 41 16	0 42 47
17	0 24 1	0 25 7	0 26 13	0 27 20	0 28 32	0 29 46	0 31 1	0 32 16	0 33 38	0 35 3	0 36 23	0 37 43	0 39 11	0 40 41	0 42 11
18	0 23 34	0 24 39	0 25 45	0 26 51	0 28 2	0 29 15	0 30 30	0 31 45	0 33 5	0 34 28	0 35 48	0 37 9	0 38 36	0 40 5	0 41 34
19	0 23 6	0 24 10	0 25 15	0 26 21	0 27 31	0 28 43	0 29 57	0 31 12	0 32 30	0 33 51	0 35 11	0 36 33	0 38 0	0 39 27	0 40 55
20	0 22 37	0 23 40	0 24 44	0 25 50	0 26 59	0 28 10	0 29 23	0 30 38	0 31 54	0 33 12	0 34 32	0 35 55	0 37 22	0 38 48	0 40 15
21	0 22 3	0 23 6	0 24 9	0 25 15	0 26 23	0 27 33	0 28 45	0 29 59	0 31 14	0 32 32	0 33 51	0 35 13	0 36 39	0 38 5	0 39 31
22	0 21 23	0 22 25	0 23 28	0 24 34	0 25 21	0 26 49	0 28 0	0 29 14	0 30 28	0 31 45	0 33 4	0 34 25	0 35 50	0 37 15	0 38 41
23	0 20 33	0 21 34	0 22 37	0 23 43	0 24 50	0 25 57	0 27 7	0 28 19	0 29 33	0 30 49	0 32 7	0 33 28	0 34 51	0 36 15	0 37 40

LATITUDE 58° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 52 50	0 54 42	0 56 37	0 58 34	1 0 33	1 2 35	1 4 39	1 6 45	1 8 54	1 11 5	1 13 19	1 15 35	1 17 52	1 20 13	1 22 35
1	0 53 20	0 55 13	0 57 9	0 59 7	1 1 7	1 3 11	1 5 16	1 7 24	1 9 35	1 11 47	1 14 2	1 16 19	1 18 37	1 21 0	1 23 23
2	0 53 51	0 55 45	0 57 42	0 59 41	1 1 42	1 3 48	1 5 54	1 8 4	1 10 17	1 12 30	1 14 41	1 17 4	1 19 23	1 21 48	1 24 13
3	0 54 23	0 56 18	0 58 16	1 0 16	1 2 18	1 4 26	1 6 33	1 8 45	1 11 0	1 13 14	1 15 31	1 17 51	1 20 10	1 22 40	1 25 5
4	0 54 56	0 56 52	0 58 51	1 0 52	1 2 55	1 5 5	1 7 13	1 9 27	1 11 44	1 13 59	1 16 17	1 18 39	1 20 58	1 23 32	1 25 59
5	0 55 30	0 57 27	0 59 28	1 1 29	1 3 33	1 5 45	1 7 54	1 10 11	1 12 29	1 14 45	1 17 4	1 19 28	1 21 48	1 24 25	1 26 53
6	0 56 4	0 58 2	1 0 5	1 2 8	1 4 14	1 6 27	1 8 37	1 10 55	1 13 14	1 15 33	1 17 53	1 20 19	1 22 40	1 25 18	1 27 49
7	0 56 39	0 58 38	1 0 43	1 2 48	1 4 56	1 7 10	1 9 21	1 11 40	1 14 0	1 16 22	1 18 44	1 21 11	1 23 35	1 26 12	1 28 45
8	0 57 15	0 59 16	1 1 22	1 3 29	1 5 39	1 7 54	1 10 6	1 12 26	1 14 48	1 17 12	1 19 36	1 22 4	1 24 32	1 27 8	1 29 43
9	0 57 51	0 59 55	1 2 2	1 4 11	1 6 23	1 8 38	1 10 53	1 13 13	1 15 37	1 18 2	1 20 29	1 22 59	1 25 30	1 28 6	1 30 42
10	0 58 28	1 0 35	1 2 43	1 4 54	1 7 8	1 9 23	1 11 41	1 14 2	1 16 27	1 18 54	1 21 23	1 23 55	1 26 30	1 29 6	1 31 43
11	0 59 7	1 1 16	1 3 25	1 5 38	1 7 55	1 10 10	1 12 31	1 14 52	1 17 19	1 19 48	1 22 19	1 24 53	1 27 30	1 30 8	1 32 46
12	0 59 47	1 1 58	1 4 8	1 6 23	1 8 41	1 10 59	1 13 22	1 15 44	1 18 13	1 20 43	1 23 17	1 25 53	1 28 32	1 31 12	1 33 51
13	1 0 28	1 2 41	1 4 52	1 7 9	1 9 30	1 11 50	1 14 14	1 16 38	1 19 8	1 21 40	1 24 16	1 26 55	1 29 36	1 32 18	1 34 58
14	1 1 10	1 3 25	1 5 37	1 7 56	1 10 20	1 12 42	1 15 7	1 17 33	1 20 5	1 22 39	1 25 16	1 27 59	1 30 42	1 33 26	1 36 7
15	1 1 53	1 4 10	1 6 23	1 8 45	1 11 11	1 13 35	1 16 2	1 18 29	1 21 3	1 23 40	1 26 18	1 29 4	1 31 48	1 34 35	1 37 18
16	1 2 38	1 4 55	1 7 11	1 9 36	1 12 4	1 14 30	1 16 59	1 19 27	1 22 3	1 24 41	1 27 22	1 30 9	1 32 56	1 35 46	1 38 31
17	1 3 24	1 5 41	1 8 0	1 10 28	1 12 58	1 15 26	1 17 57	1 20 26	1 23 4	1 25 44	1 28 28	1 31 15	1 34 5	1 36 58	1 39 46
18	1 4 11	1 6 28	1 8 50	1 11 22	1 13 52	1 16 23	1 18 56	1 21 26	1 24 7	1 26 49	1 29 35	1 32 23	1 35 16	1 38 12	1 41 4
19	1 4 59	1 7 17	1 9 42	1 12 16	1 14 48	1 17 21	1 19 56	1 22 29	1 25 11	1 27 56	1 30 43	1 33 33	1 36 29	1 39 28	1 42 24
20	1 5 49	1 8 7	1 10 35	1 13 12	1 15 45	1 18 21	1 20 57	1 23 34	1 26 16	1 29 5	1 31 54	1 34 45	1 37 44	1 40 45	1 43 46
21	1 6 42	1 9 2	1 11 31	1 14 10	1 16 45	1 19 23	1 22 3	1 24 41	1 27 26	1 30 17	1 33 8	1 36 3	1 39 3	1 42 5	1 45 12
22	1 7 40	1 10 4	1 12 35	1 15 13	1 17 51	1 20 30	1 23 14	1 25 58	1 28 42	1 31 36	1 34 30	1 37 29	1 40 51	1 43 33	1 46 43
23	1 8 42	1 11 12	1 13 46	1 16 21	1 19 3	1 21 43	1 24 29	1 27 25	1 30 5	1 33 3	1 36 0	1 39 3	1 42 8	1 45 9	1 48 20

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 52 50	0 54 42	0 56 37	0 58 34	1 0 33	1 2 35	1 4 39	1 6 45	1 8 54	1 11 5	1 13 19	1 15 35	1 17 52	1 20 13	1 22 35
1	0 52 18	0 54 9	0 56 2	0 57 58	0 59 56	1 1 57	1 4 1	1 6 5	1 8 12	1 10 22	1 12 35	1 14 49	1 17 4	1 19 23	1 21 43
2	0 51 46	0 53 36	0 55 27	0 57 22	0 59 19	1 1 19	1 3 23	1 5 25	1 7 30	1 9 39	1 11 51	1 14 3	1 16 16	1 18 35	1 20 54
3	0 51 14	0 53 3	0 54 52	0 56 46	0 58 42	1 0 41	1 2 45	1 4 45	1 6 48	1 8 56	1 11 7	1 13 18	1 15 29	1 17 46	1 20 4
4	0 50 42	0 52 30	0 54 18	0 56 10	0 58 5	1 0 3	1 2 7	1 4 6	1 6 6	1 8 13	1 10 24	1 12 33	1 14 42	1 16 57	1 19 14
5	0 50 11	0 51 57	0 53 44	0 55 34	0 57 28	0 59 26	1 1 30	1 3 27	1 5 25	1 7 31	1 9 41	1 11 48	1 13 55	1 16 8	1 18 24
6	0 49 40	0 51 25	0 53 11	0 55 1	0 56 53	0 58 50	1 0 51	1 2 48	1 4 46	1 6 50	1 8 58	1 11 4	1 13 11	1 15 23	1 17 37
7	0 49 9	0 50 53	0 52 39	0 54 28	0 56 19	0 58 14	1 0 12	1 2 9	1 4 7	1 6 9	1 8 15	1 10 20	1 12 27	1 14 38	1 16 51
8	0 48 38	0 50 21	0 52 7	0 53 55	0 55 45	0 57 38	0 59 34	1 1 30	1 3 28	1 5 29	1 7 33	1 9 37	1 11 43	1 13 53	1 16 5
9	0 48 7	0 49 50	0 51 35	0 53 22	0 55 11	0 57 2	0 58 56	1 0 51	1 2 49	1 4 49	1 6 51	1 8 54	1 10 59	1 13 8	1 15 19
10	0 47 36	0 49 19	0 51 3	0 52 49	0 54 37	0 56 26	0 58 18	1 0 13	1 2 10	1 4 8	1 6 9	1 8 11	1 10 16	1 12 23	1 14 33
11	0 47 6	0 48 48	0 50 31	0 52 16	0 54 3	0 55 52	0 57 42	0 59 36	1 1 32	1 3 29	1 5 21	1 7 29	1 9 33	1 11 38	1 13 47
12	0 46 35	0 48 16	0 49 58	0 51 43	0 53 29	0 55 16	0 57 6	0 58 58	1 0 52	1 2 48	1 4 42	1 6 47	1 8 49	1 10 52	1 13 0
13	0 46 2	0 47 42	0 49 23	0 51 8	0 52 53	0 54 39	0 56 28	0 58 18	1 0 11	1 2 6	1 4 1	1 6 4	1 8 4	1 10 6	1 12 12
14	0 45 28	0 47 7	0 48 49	0 50 32	0 52 15	0 54 0	0 55 48	0 57 37	0 59 29	1 1 23	1 3 19	1 5 19	1 7 18	1 9 19	1 11 24
15	0 44 54	0 46 31	0 48 12	0 49 54	0 51 36	0 53 20	0 55 7	0 56 55	0 58 45	1 0 38	1 2 35	1 4 33	1 6 31	1 8 31	1 10 35
16	0 44 19	0 45 55	0 47 34	0 49 16	0 50 56	0 52 39	0 54 25	0 56 12	0 58 1	0 59 53	1 1 50	1 3 47	1 5 43	1 7 42	1 9 45
17	0 43 43	0 45 18	0 46 55	0 48 37	0 50 15	0 51 57	0 53 42	0 55 28	0 57 16	0 59 7	1 1 4	1 3 0	1 4 53	1 6 51	1 8 53
18	0 43 5	0 44 39	0 46 15	0 47 55	0 49 33	0 51 14	0 52 58	0 54 43	0 56 30	0 58 20	1 0 16	1 2 11	1 4 2	1 5 59	1 8 0
19	0 42 25	0 43 58	0 45 33	0 47 11	0 48 49	0 50 30	0 52 13	0 53 57	0 55 43	0 57 33	0 59 25	1 1 20	1 3 10	1 5 6	1 7 6
20	0 41 44	0 43 16	0 44 50	0 46 26	0 48 4	0 49 44	0 51 26	0 53 9	0 54 55	0 56 44	0 58 33	1 0 24	1 2 17	1 4 12	1 6 10
21	0 41 0	0 42 31	0 44 4	0 45 39	0 47 16	0 48 55	0 50 36	0 52 18	0 54 3	0 55 51	0 57 39	0 59 29	1 1 21	1 3 15	1 5 13
22	0 40 9	0 41 39	0 43 11	0 44 45	0 46 21	0 47 59	0 49 38	0 51 20	0 53 4	0 54 51	0 56 38	0 58 27	1 0 18	1 2 11	1 4 8
23	0 39 7	0 40 36	0 42 7	0 43 40	0 45 16	0 46 53	0 48 31	0 50 12	0 51 55	0 53 40	0 55 27	0 57 14	0 59 4	1 0 56	1 2 50

LATITUDE 59° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec	HOUR ANGLE OR TIME FROM NOON.													
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 9 48	0 9 53	0 10 0	0 10 7	0 10 17	0 10 31	0 10 46	0 11 4	0 11 24	0 11 46	0 12 11	0 12 38	0 13 7	0 13 39	0 14 13
1	0 9 52	0 9 57	0 10 3	0 10 11	0 10 21	0 10 34	0 10 50	0 11 8	0 11 30	0 11 53	0 12 17	0 12 43	0 13 14	0 13 46	0 14 21
2	0 9 59	0 10 1	0 10 6	0 10 14	0 10 26	0 10 39	0 10 55	0 11 12	0 11 34	0 11 58	0 12 23	0 12 49	0 13 20	0 13 52	0 14 27
3	0 10 1	0 10 4	0 10 9	0 10 18	0 10 30	0 10 43	0 10 59	0 11 16	0 11 39	0 12 2	0 12 28	0 12 54	0 13 26	0 13 58	0 14 34
4	0 10 3	0 10 7	0 10 12	0 10 21	0 10 33	0 10 46	0 11 2	0 11 20	0 11 43	0 12 6	0 12 32	0 12 59	0 13 31	0 14 3	0 14 39
5	0 10 6	0 10 11	0 10 16	0 10 24	0 10 36	0 10 50	0 11 6	0 11 24	0 11 46	0 12 9	0 12 36	0 13 3	0 13 35	0 14 8	0 14 45
6	0 10 9	0 10 15	0 10 20	0 10 27	0 10 40	0 10 54	0 11 10	0 11 28	0 11 49	0 12 12	0 12 40	0 13 8	0 13 39	0 14 13	0 14 52
7	0 10 12	0 10 18	0 10 24	0 10 30	0 10 44	0 10 59	0 11 15	0 11 32	0 11 53	0 12 16	0 12 43	0 13 13	0 13 45	0 14 20	0 14 57
8	0 10 15	0 10 20	0 10 27	0 10 33	0 10 47	0 11 1	0 11 18	0 11 35	0 11 57	0 12 20	0 12 48	0 13 18	0 13 50	0 14 26	0 15 1
9	0 10 17	0 10 22	0 10 29	0 10 36	0 10 49	0 11 3	0 11 21	0 11 38	0 12 1	0 12 24	0 12 53	0 13 22	0 13 56	0 14 31	0 15 6
10	0 10 19	0 10 24	0 10 30	0 10 40	0 10 51	0 11 4	0 11 23	0 11 41	0 12 5	0 12 29	0 12 58	0 13 27	0 14 2	0 14 36	0 15 11
11	0 10 20	0 10 26	0 10 32	0 10 42	0 10 55	0 11 6	0 11 26	0 11 44	0 12 8	0 12 33	0 13 2	0 13 31	0 14 6	0 14 41	0 15 17
12	0 10 21	0 10 28	0 10 34	0 10 44	0 10 57	0 11 8	0 11 29	0 11 47	0 12 11	0 12 37	0 13 6	0 13 35	0 14 10	0 14 46	0 15 23
13	0 10 23	0 10 30	0 10 36	0 10 46	0 10 59	0 11 11	0 11 32	0 11 50	0 12 14	0 12 41	0 13 10	0 13 39	0 14 15	0 14 51	0 15 29
14	0 10 25	0 10 32	0 10 38	0 10 48	0 11 1	0 11 14	0 11 35	0 11 53	0 12 17	0 12 45	0 13 14	0 13 44	0 14 20	0 14 56	0 15 35
15	0 10 27	0 10 34	0 10 40	0 10 50	0 11 3	0 11 17	0 11 38	0 11 56	0 12 20	0 12 49	0 13 18	0 13 49	0 14 25	0 15 2	0 15 42
16	0 10 29	0 10 37	0 10 43	0 10 52	0 11 5	0 11 20	0 11 40	0 11 59	0 12 24	0 12 53	0 13 22	0 13 54	0 14 30	0 15 8	0 15 49
17	0 10 31	0 10 40	0 10 46	0 10 54	0 11 7	0 11 23	0 11 42	0 12 3	0 12 28	0 12 56	0 13 27	0 13 59	0 14 35	0 15 14	0 15 56
18	0 10 32	0 10 43	0 10 48	0 10 56	0 11 10	0 11 26	0 11 45	0 12 6	0 12 31	0 13 0	0 13 31	0 14 4	0 14 40	0 15 20	0 16 3
19	0 10 33	0 10 46	0 10 50	0 10 58	0 11 13	0 11 29	0 11 48	0 12 10	0 12 35	0 13 4	0 13 35	0 14 8	0 14 46	0 15 26	0 16 10
20	0 10 35	0 10 49	0 10 52	0 11 0	0 11 16	0 11 32	0 11 51	0 12 14	0 12 39	0 13 8	0 13 39	0 14 14	0 14 52	0 15 32	0 16 17
21	0 10 37	0 10 52	0 10 53	0 11 2	0 11 19	0 11 35	0 11 54	0 12 18	0 12 43	0 13 12	0 13 44	0 14 19	0 14 58	0 15 39	0 16 24
22	0 10 39	0 10 55	0 10 56	0 11 4	0 11 21	0 11 38	0 11 58	0 12 22	0 12 47	0 13 16	0 13 49	0 14 25	0 15 4	0 15 46	0 16 31
23	0 10 41	0 10 58	0 11 0	0 11 6	0 11 23	0 11 42	0 12 3	0 12 26	0 12 51	0 13 21	0 13 54	0 14 31	0 15 10	0 15 53	0 16 39

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 9 48	0 9 53	0 10 0	0 10 7	0 10 17	0 10 31	0 10 46	0 11 4	0 11 24	0 11 46	0 12 11	0 12 38	0 13 7	0 13 39	0 14 13
1	0 9 44	0 9 49	0 9 55	0 10 3	0 10 13	0 10 27	0 10 41	0 10 58	0 11 18	0 11 41	0 12 5	0 12 32	0 13 1	0 13 33	0 14 7
2	0 9 40	0 9 45	0 9 50	0 9 59	0 10 9	0 10 23	0 10 36	0 10 52	0 11 12	0 11 35	0 11 59	0 12 26	0 12 55	0 13 27	0 14 0
3	0 9 36	0 9 40	0 9 45	0 9 54	0 10 5	0 10 18	0 10 31	0 10 46	0 11 6	0 11 29	0 11 53	0 12 20	0 12 49	0 13 20	0 13 53
4	0 9 32	0 9 35	0 9 40	0 9 49	0 10 0	0 10 13	0 10 26	0 10 39	0 11 0	0 11 23	0 11 47	0 12 14	0 12 42	0 13 13	0 13 46
5	0 9 28	0 9 30	0 9 35	0 9 44	0 9 55	0 10 8	0 10 20	0 10 32	0 10 53	0 11 17	0 11 41	0 12 7	0 12 35	0 13 6	0 13 39
6	0 9 23	0 9 24	0 9 29	0 9 38	0 9 49	0 10 1	0 10 13	0 10 26	0 10 50	0 11 11	0 11 33	0 11 59	0 12 27	0 12 57	0 13 30
7	0 9 17	0 9 18	0 9 22	0 9 32	0 9 42	0 9 54	0 10 6	0 10 20	0 10 46	0 11 5	0 11 25	0 11 51	0 12 18	0 12 48	0 13 21
8	0 9 10	0 9 11	0 9 15	0 9 25	0 9 34	0 9 46	0 9 59	0 10 14	0 10 42	0 10 59	0 11 17	0 11 43	0 12 9	0 12 39	0 13 11
9	0 9 2	0 9 3	0 9 8	0 9 17	0 9 26	0 9 38	0 9 52	0 10 7	0 10 38	0 10 53	0 11 8	0 11 34	0 12 0	0 12 30	0 13 1
10	0 8 53	0 8 54	0 9 1	0 9 8	0 9 16	0 9 30	0 9 45	0 10 0	0 10 34	0 10 47	0 11 0	0 11 25	0 11 51	0 12 21	0 12 51
11	0 8 43	0 8 44	0 8 53	0 8 58	0 9 6	0 9 19	0 9 34	0 9 49	0 10 19	0 10 33	0 10 47	0 11 12	0 11 39	0 12 9	0 12 40
12	0 8 32	0 8 34	0 8 44	0 8 48	0 8 56	0 9 8	0 9 23	0 9 38	0 10 4	0 10 19	0 10 33	0 10 59	0 11 27	0 11 59	0 12 28
13	0 8 21	0 8 24	0 8 33	0 8 37	0 8 45	0 8 57	0 9 11	0 9 26	0 9 49	0 10 4	0 10 19	0 10 45	0 11 15	0 11 47	0 12 15
14	0 8 10	0 8 13	0 8 21	0 8 26	0 8 34	0 8 46	0 8 59	0 9 14	0 9 34	0 9 49	0 10 5	0 10 31	0 11 2	0 11 35	0 12 2
15	0 7 58	0 8 2	0 8 8	0 8 15	0 8 23	0 8 35	0 8 47	0 9 2	0 9 19	0 9 34	0 9 51	0 10 17	0 10 50	0 11 19	0 11 48
16	0 7 43	0 7 49	0 7 53	0 8 0	0 8 9	0 8 20	0 8 32	0 8 47	0 9 4	0 9 19	0 9 36	0 10 2	0 10 35	0 11 2	0 11 31
17	0 7 25	0 7 33	0 7 35	0 7 43	0 7 52	0 8 2	0 8 15	0 8 29	0 8 46	0 9 2	0 9 19	0 9 45	0 10 19	0 10 43	0 11 12
18	0 7 4	0 7 14	0 7 15	0 7 23	0 7 32	0 7 42	0 7 55	0 8 9	0 8 26	0 8 43	0 9 0	0 9 26	0 9 59	0 10 21	0 10 50
19	0 6 43	0 6 51	0 6 53	0 7 1	0 7 10	0 7 20	0 7 43	0 7 47	0 8 4	0 8 22	0 8 40	0 9 4	0 9 37	0 9 57	0 10 26
20	0 6 21	0 6 25	0 6 29	0 6 37	0 6 46	0 6 55	0 7 8	0 7 22	0 7 39	0 7 58	0 8 18	0 8 39	0 9 3	0 9 30	0 9 58
21	0 5 43	0 5 55	0 5 59	0 6 7	0 6 16	0 6 25	0 6 38	0 6 52	0 7 9	0 7 27	0 7 47	0 8 8	0 8 32	0 8 59	0 9 25
22	0 5 4	0 5 16	0 5 21	0 5 28	0 5 37	0 5 47	0 5 59	0 6 13	0 6 30	0 6 48	0 7 7	0 7 28	0 7 53	0 8 19	0 8 45
23	0 4 25	0 4 29	0 4 34	0 4 41	0 4 50	0 5 0	0 5 11	0 5 25	0 5 42	0 6 0	0 6 19	0 6 40	0 7 5	0 7 30	0 7 56

LATITUDE 59° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 14 50	0 15 29	0 16 10	0 16 52	0 17 39	0 18 27	0 19 18	0 20 11	0 21 6	0 22 3	0 23 4	0 24 6	0 25 10	0 26 18	0 27 27
1	0 14 57	0 15 36	0 16 17	0 17 0	0 17 49	0 18 36	0 19 28	0 20 21	0 21 19	0 22 14	0 23 18	0 24 19	0 25 26	0 26 32	0 27 42
2	0 15 3	0 15 43	0 16 25	0 17 8	0 17 57	0 18 45	0 19 38	0 20 31	0 21 29	0 22 26	0 23 28	0 24 32	0 25 39	0 26 46	0 27 57
3	0 15 10	0 15 50	0 16 33	0 17 16	0 18 5	0 18 54	0 19 48	0 20 41	0 21 39	0 22 38	0 23 40	0 24 45	0 25 52	0 27 0	0 28 12
4	0 15 16	0 15 57	0 16 41	0 17 24	0 18 13	0 19 3	0 19 57	0 20 51	0 21 50	0 22 50	0 23 52	0 24 58	0 26 5	0 27 15	0 28 27
5	0 15 23	0 16 4	0 16 48	0 17 32	0 18 22	0 19 12	0 20 6	0 21 1	0 22 1	0 23 2	0 24 5	0 25 11	0 26 19	0 27 30	0 28 43
6	0 15 29	0 16 11	0 16 55	0 17 40	0 18 30	0 19 21	0 20 15	0 21 11	0 22 12	0 23 14	0 24 18	0 25 24	0 26 33	0 27 45	0 28 59
7	0 15 36	0 16 18	0 17 2	0 17 48	0 18 39	0 19 30	0 20 24	0 21 22	0 22 23	0 23 26	0 24 31	0 25 38	0 26 47	0 28 0	0 29 15
8	0 15 42	0 16 25	0 17 11	0 17 56	0 18 48	0 19 39	0 20 34	0 21 33	0 22 34	0 23 38	0 24 44	0 25 52	0 27 1	0 28 15	0 29 31
9	0 15 49	0 16 33	0 17 18	0 18 4	0 18 57	0 19 49	0 20 44	0 21 44	0 22 45	0 23 50	0 24 57	0 26 6	0 27 16	0 28 30	0 29 47
10	0 15 56	0 16 41	0 17 26	0 18 13	0 19 6	0 19 59	0 20 54	0 21 55	0 22 56	0 24 2	0 25 10	0 26 20	0 27 31	0 28 45	0 30 3
11	0 16 2	0 16 47	0 17 33	0 18 21	0 19 15	0 20 8	0 21 4	0 22 6	0 23 8	0 24 15	0 25 23	0 26 34	0 27 47	0 29 2	0 30 20
12	0 16 9	0 16 53	0 17 40	0 18 29	0 19 24	0 20 18	0 21 14	0 22 17	0 23 20	0 24 28	0 25 36	0 26 48	0 28 3	0 29 19	0 30 37
13	0 16 15	0 17 0	0 17 47	0 18 37	0 19 33	0 20 28	0 21 25	0 22 28	0 23 32	0 24 41	0 25 50	0 27 3	0 28 19	0 29 36	0 30 55
14	0 16 21	0 17 7	0 17 55	0 18 46	0 19 42	0 20 38	0 21 36	0 22 39	0 23 44	0 24 54	0 26 4	0 27 18	0 28 35	0 29 53	0 31 13
15	0 16 28	0 17 14	0 18 3	0 18 55	0 19 51	0 20 48	0 21 47	0 22 51	0 23 57	0 25 7	0 26 18	0 27 33	0 28 51	0 30 10	0 31 31
16	0 16 35	0 17 21	0 18 11	0 19 4	0 20 0	0 20 58	0 21 58	0 23 3	0 24 10	0 25 20	0 26 32	0 27 48	0 29 7	0 30 27	0 31 49
17	0 16 41	0 17 28	0 18 19	0 19 13	0 20 9	0 21 8	0 22 10	0 23 15	0 24 23	0 25 33	0 26 46	0 28 3	0 29 23	0 30 44	0 32 7
18	0 16 49	0 17 37	0 18 28	0 19 23	0 20 19	0 21 19	0 22 22	0 23 28	0 24 37	0 25 48	0 27 1	0 28 19	0 29 40	0 31 2	0 32 26
19	0 16 57	0 17 46	0 18 38	0 19 33	0 20 30	0 21 30	0 22 34	0 23 41	0 24 51	0 26 3	0 27 17	0 28 36	0 29 58	0 31 21	0 32 46
20	0 17 5	0 17 55	0 18 48	0 19 43	0 20 41	0 21 41	0 22 46	0 23 54	0 25 5	0 26 19	0 27 34	0 28 53	0 30 17	0 31 41	0 33 7
21	0 17 13	0 18 4	0 18 58	0 19 53	0 20 52	0 21 52	0 22 58	0 24 7	0 25 19	0 26 35	0 27 51	0 29 12	0 30 36	0 32 2	0 33 30
22	0 17 21	0 18 13	0 19 8	0 20 4	0 21 3	0 22 4	0 23 10	0 24 20	0 25 33	0 26 51	0 28 9	0 29 32	0 30 57	0 32 24	0 33 54
23	0 17 29	0 18 23	0 19 18	0 20 15	0 21 14	0 22 16	0 23 22	0 24 33	0 25 48	0 27 7	0 28 29	0 29 53	0 31 19	0 32 47	0 34 19

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 14 50	0 15 29	0 16 10	0 16 52	0 17 39	0 18 27	0 19 18	0 20 11	0 21 6	0 22 3	0 23 4	0 24 6	0 25 12	0 26 18	0 27 27
1	0 14 43	0 15 22	0 16 2	0 16 43	0 17 28	0 18 14	0 19 8	0 20 1	0 20 55	0 21 51	0 22 52	0 23 54	0 24 59	0 26 4	0 27 12
2	0 14 36	0 15 15	0 15 54	0 16 34	0 17 16	0 18 1	0 18 58	0 19 50	0 20 44	0 21 39	0 22 40	0 23 42	0 24 46	0 25 50	0 26 57
3	0 14 29	0 15 7	0 15 46	0 16 23	0 17 4	0 17 48	0 18 48	0 19 39	0 20 32	0 21 27	0 22 28	0 23 29	0 24 32	0 25 35	0 26 42
4	0 14 22	0 14 59	0 15 37	0 16 14	0 16 52	0 17 34	0 18 37	0 19 28	0 20 20	0 21 15	0 22 16	0 23 16	0 24 18	0 25 20	0 26 27
5	0 14 15	0 14 51	0 15 28	0 16 4	0 16 40	0 17 20	0 18 26	0 19 17	0 20 8	0 21 2	0 22 3	0 23 3	0 24 3	0 25 5	0 26 12
6	0 14 5	0 14 41	0 15 18	0 15 55	0 16 32	0 17 13	0 18 15	0 19 5	0 19 56	0 20 50	0 21 50	0 22 48	0 23 48	0 24 50	0 25 56
7	0 13 55	0 14 31	0 15 8	0 15 46	0 16 24	0 17 6	0 18 4	0 18 53	0 19 43	0 20 38	0 21 36	0 22 33	0 23 33	0 24 35	0 25 40
8	0 13 45	0 14 21	0 14 58	0 15 36	0 16 16	0 16 59	0 17 52	0 18 40	0 19 32	0 20 25	0 21 22	0 22 18	0 23 18	0 24 20	0 25 24
9	0 13 35	0 14 11	0 14 47	0 15 26	0 16 7	0 16 52	0 17 40	0 18 27	0 19 19	0 20 12	0 21 8	0 22 3	0 23 3	0 24 4	0 25 7
10	0 13 25	0 14 0	0 14 36	0 15 16	0 15 58	0 16 45	0 17 28	0 18 14	0 19 6	0 19 59	0 20 52	0 21 48	0 22 48	0 23 48	0 24 50
11	0 13 14	0 13 48	0 14 24	0 15 5	0 15 47	0 16 33	0 17 16	0 18 2	0 18 53	0 19 45	0 20 38	0 21 33	0 22 32	0 23 33	0 24 32
12	0 13 2	0 13 35	0 14 11	0 14 52	0 15 34	0 16 19	0 17 2	0 17 48	0 18 38	0 19 29	0 20 22	0 21 16	0 22 15	0 23 16	0 24 13
13	0 12 49	0 13 21	0 13 57	0 14 38	0 15 19	0 16 3	0 16 46	0 17 32	0 18 21	0 19 12	0 20 4	0 20 58	0 21 56	0 22 57	0 23 53
14	0 12 35	0 13 6	0 13 42	0 14 22	0 15 2	0 15 45	0 16 29	0 17 14	0 18 2	0 18 53	0 19 45	0 20 39	0 21 35	0 22 35	0 23 32
15	0 12 19	0 12 51	0 13 26	0 14 4	0 14 43	0 15 25	0 16 9	0 16 54	0 17 42	0 18 32	0 19 24	0 20 18	0 21 13	0 22 10	0 23 9
16	0 12 1	0 12 33	0 13 8	0 13 44	0 14 23	0 15 4	0 15 48	0 16 32	0 17 21	0 18 10	0 19 2	0 19 55	0 20 50	0 21 46	0 22 45
17	0 11 41	0 12 12	0 12 47	0 13 23	0 14 2	0 14 41	0 15 26	0 16 9	0 16 58	0 17 46	0 18 38	0 19 30	0 20 25	0 21 21	0 22 20
18	0 11 19	0 11 50	0 12 25	0 13 0	0 13 39	0 14 17	0 15 2	0 15 45	0 16 34	0 17 21	0 18 12	0 19 4	0 19 59	0 20 55	0 21 53
19	0 10 54	0 11 26	0 12 1	0 12 36	0 13 15	0 13 52	0 14 37	0 15 20	0 16 9	0 16 55	0 17 44	0 18 36	0 19 31	0 20 27	0 21 24
20	0 10 27	0 10 59	0 11 34	0 12 11	0 12 48	0 13 26	0 14 9	0 14 54	0 15 43	0 16 28	0 17 14	0 18 4	0 18 59	0 19 54	0 20 51
21	0 9 52	0 10 24	0 10 59	0 11 37	0 12 13	0 12 51	0 13 35	0 14 19	0 15 7	0 15 52	0 16 38	0 17 28	0 18 23	0 19 18	0 20 14
22	0 9 11	0 9 44	0 10 18	0 10 55	0 11 31	0 12 9	0 12 52	0 13 35	0 14 21	0 15 7	0 15 54	0 16 44	0 17 37	0 18 32	0 19 28
23	0 8 24	0 8 57	0 9 31	0 10 5	0 10 41	0 11 19	0 11 59	0 12 41	0 13 25	0 14 12	0 15 0	0 15 49	0 16 41	0 17 36	0 18 31

LATITUDE 59° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 28 38	0 29 57	0 31 8	0 32 26	0 33 47	0 35 10	0 36 36	0 38 4	0 39 34	0 41 6	0 42 41	0 44 17	0 45 57	0 47 39	0 49 22
1	0 28 54	0 30 12	0 31 26	0 32 46	0 34 5	0 35 35	0 36 57	0 38 26	0 39 57	0 41 36	0 43 7	0 44 44	0 46 25	0 48 15	0 49 52
2	0 29 10	0 30 27	0 31 44	0 33 3	0 34 26	0 35 54	0 37 18	0 38 46	0 40 20	0 41 59	0 43 33	0 45 9	0 46 53	0 48 41	0 50 22
3	0 29 26	0 30 44	0 32 2	0 33 21	0 34 46	0 36 14	0 37 39	0 39 7	0 40 43	0 42 23	0 43 59	0 45 35	0 47 21	0 49 9	0 50 52
4	0 29 42	0 31 0	0 32 20	0 33 39	0 35 6	0 36 34	0 38 0	0 39 30	0 41 6	0 42 47	0 44 25	0 46 1	0 47 49	0 49 38	0 51 22
5	0 29 58	0 31 17	0 32 38	0 33 58	0 35 26	0 36 55	0 38 22	0 39 55	0 41 30	0 43 15	0 44 51	0 46 28	0 48 17	0 50 7	0 51 53
6	0 30 13	0 31 33	0 32 56	0 34 17	0 35 46	0 37 16	0 38 44	0 40 18	0 41 54	0 43 37	0 45 17	0 46 55	0 48 45	0 50 37	0 52 23
7	0 30 29	0 31 52	0 33 14	0 34 37	0 36 6	0 37 38	0 39 6	0 40 41	0 42 18	0 44 3	0 45 44	0 47 23	0 49 13	0 51 1	0 52 55
8	0 30 46	0 32 9	0 33 32	0 34 57	0 36 26	0 37 58	0 39 28	0 41 4	0 42 42	0 44 24	0 46 11	0 47 51	0 49 41	0 51 26	0 53 26
9	0 31 3	0 32 26	0 33 50	0 35 17	0 36 46	0 38 18	0 39 50	0 41 27	0 43 6	0 44 45	0 46 38	0 48 19	0 50 10	0 51 51	0 53 57
10	0 31 21	0 32 44	0 34 9	0 35 37	0 37 6	0 38 39	0 40 12	0 41 41	0 43 31	0 45 6	0 47 5	0 48 47	0 50 39	0 52 20	0 54 28
11	0 31 40	0 33 4	0 34 29	0 35 58	0 37 27	0 39 1	0 40 36	0 42 16	0 43 56	0 45 39	0 47 33	0 49 17	0 51 9	0 53 0	0 55 6
12	0 31 59	0 33 24	0 34 50	0 36 20	0 37 49	0 39 24	0 41 1	0 42 42	0 44 24	0 46 12	0 48 3	0 49 48	0 51 40	0 53 43	0 55 45
13	0 32 18	0 33 44	0 35 12	0 36 42	0 38 12	0 39 48	0 41 27	0 43 9	0 44 52	0 46 45	0 48 34	0 50 20	0 52 12	0 54 23	0 56 24
14	0 32 37	0 34 5	0 35 34	0 37 5	0 38 36	0 40 14	0 41 54	0 43 36	0 45 21	0 47 27	0 49 16	0 50 53	0 52 46	0 55 3	0 57 3
15	0 32 56	0 34 26	0 35 56	0 37 28	0 39 0	0 40 41	0 42 22	0 44 4	0 45 51	0 47 51	0 49 39	0 51 28	0 53 22	0 55 43	0 57 42
16	0 33 15	0 34 47	0 36 18	0 37 51	0 39 25	0 41 9	0 42 50	0 44 33	0 46 22	0 48 24	0 50 13	0 52 4	0 53 59	0 56 23	0 58 31
17	0 33 35	0 35 8	0 36 41	0 38 15	0 39 51	0 41 40	0 43 20	0 45 3	0 46 54	0 48 58	0 50 48	0 52 41	0 54 37	0 57 1	0 59 0
18	0 33 55	0 35 29	0 37 5	0 38 40	0 40 18	0 42 9	0 43 50	0 45 35	0 47 28	0 49 34	0 51 27	0 53 21	0 55 17	0 57 43	0 59 44
19	0 34 16	0 35 51	0 37 30	0 39 6	0 40 46	0 42 38	0 44 21	0 46 9	0 48 4	0 50 12	0 52 9	0 54 4	0 56 1	0 58 26	1 0 28
20	0 34 39	0 36 14	0 37 55	0 39 32	0 41 14	0 43 7	0 44 53	0 46 44	0 48 42	0 50 53	0 52 54	0 54 50	0 56 48	0 59 10	1 1 12
21	0 35 3	0 36 39	0 38 21	0 40 0	0 41 44	0 43 36	0 45 25	0 47 21	0 49 24	0 51 36	0 53 45	0 55 40	0 57 38	0 59 56	1 1 56
22	0 35 28	0 37 5	0 38 47	0 40 29	0 42 15	0 44 6	0 45 57	0 48 0	0 50 8	0 52 23	0 54 39	0 56 35	0 58 31	1 0 43	1 2 40
23	0 35 54	0 37 32	0 39 14	0 40 59	0 42 47	0 44 36	0 46 30	0 48 40	0 50 54	0 53 12	0 55 35	0 57 31	0 59 28	1 1 26	1 3 25

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 28 38	0 29 57	0 31 8	0 32 26	0 33 47	0 35 10	0 36 36	0 38 4	0 39 34	0 41 6	0 42 41	0 44 17	0 45 57	0 47 39	0 49 22
1	0 28 23	0 29 40	0 30 51	0 32 9	0 33 29	0 34 51	0 36 16	0 37 43	0 39 12	0 40 43	0 42 17	0 43 53	0 45 32	0 47 13	0 48 55
2	0 28 8	0 29 23	0 30 34	0 31 52	0 33 11	0 34 32	0 35 56	0 37 22	0 38 50	0 40 20	0 41 53	0 43 29	0 45 7	0 46 47	0 48 28
3	0 27 52	0 29 6	0 30 17	0 31 34	0 32 53	0 34 13	0 35 36	0 37 1	0 38 28	0 39 57	0 41 29	0 43 4	0 44 41	0 46 21	0 48 1
4	0 27 36	0 28 47	0 30 0	0 31 16	0 32 35	0 33 54	0 35 16	0 36 39	0 38 5	0 39 34	0 41 5	0 42 39	0 44 15	0 45 54	0 47 33
5	0 27 20	0 28 30	0 29 43	0 30 58	0 32 16	0 33 35	0 34 55	0 36 17	0 37 42	0 39 10	0 40 41	0 42 14	0 43 49	0 45 27	0 47 5
6	0 27 3	0 28 12	0 29 25	0 30 39	0 31 56	0 33 14	0 34 34	0 35 55	0 37 20	0 38 47	0 40 17	0 41 48	0 43 22	0 44 59	0 46 36
7	0 26 46	0 27 54	0 29 7	0 30 20	0 31 36	0 32 53	0 34 12	0 35 33	0 36 57	0 38 24	0 39 52	0 41 22	0 42 55	0 44 31	0 46 7
8	0 26 29	0 27 36	0 28 48	0 30 1	0 31 16	0 32 32	0 33 50	0 35 10	0 36 34	0 38 0	0 39 27	0 40 56	0 42 28	0 44 3	0 45 38
9	0 26 12	0 27 18	0 28 29	0 29 41	0 30 55	0 32 11	0 33 28	0 34 47	0 36 11	0 37 36	0 39 2	0 40 29	0 42 1	0 43 35	0 45 8
10	0 25 54	0 27 0	0 28 10	0 29 21	0 30 34	0 31 50	0 33 6	0 34 24	0 35 48	0 37 12	0 38 37	0 40 2	0 41 34	0 43 6	0 44 38
11	0 25 36	0 26 41	0 27 53	0 29 1	0 30 13	0 31 29	0 32 44	0 34 1	0 35 26	0 36 49	0 38 13	0 39 37	0 41 4	0 42 36	0 44 11
12	0 25 17	0 26 21	0 27 35	0 28 40	0 29 52	0 31 7	0 32 21	0 33 37	0 35 2	0 36 24	0 37 48	0 39 10	0 40 32	0 42 5	0 43 42
13	0 24 56	0 26 0	0 27 13	0 28 18	0 29 29	0 30 43	0 31 57	0 33 13	0 34 36	0 35 58	0 37 21	0 38 41	0 39 59	0 41 32	0 43 11
14	0 24 34	0 25 38	0 26 49	0 27 55	0 29 5	0 30 18	0 31 31	0 32 48	0 34 8	0 35 30	0 36 52	0 38 9	0 39 25	0 40 58	0 42 39
15	0 24 11	0 25 15	0 26 22	0 27 30	0 28 39	0 29 50	0 31 4	0 32 20	0 33 38	0 34 58	0 36 20	0 37 35	0 38 50	0 40 23	0 42 6
16	0 23 47	0 24 50	0 25 55	0 27 3	0 28 11	0 29 21	0 30 35	0 31 50	0 33 7	0 34 26	0 35 47	0 37 3	0 38 19	0 39 50	0 41 32
17	0 23 21	0 24 23	0 25 27	0 26 34	0 27 41	0 28 51	0 30 4	0 31 18	0 32 35	0 33 53	0 35 13	0 36 30	0 37 47	0 39 16	0 40 56
18	0 22 53	0 23 54	0 24 57	0 26 3	0 27 10	0 28 20	0 29 32	0 30 35	0 32 1	0 33 18	0 34 37	0 35 55	0 37 14	0 38 52	0 40 18
19	0 22 23	0 23 23	0 24 25	0 25 31	0 26 38	0 27 38	0 28 59	0 30 11	0 31 26	0 32 42	0 34 0	0 35 19	0 36 40	0 38 6	0 39 37
20	0 21 50	0 22 50	0 23 52	0 24 57	0 26 4	0 27 14	0 28 24	0 29 36	0 30 50	0 32 5	0 33 22	0 34 42	0 36 4	0 37 28	0 38 54
21	0 21 12	0 22 14	0 23 16	0 24 20	0 25 26	0 26 35	0 27 44	0 28 53	0 30 7	0 31 22	0 32 39	0 33 55	0 35 16	0 36 39	0 38 5
22	0 20 25	0 21 28	0 22 30	0 23 32	0 24 38	0 25 46	0 26 54	0 28 3	0 29 16	0 30 30	0 31 47	0 33 1	0 34 21	0 35 43	0 37 8
23	0 19 27	0 20 25	0 21 26	0 22 29	0 23 35	0 24 42	0 25 50	0 26 59	0 28 11	0 29 25	0 30 41	0 31 58	0 33 17	0 34 39	0 36 2

LATITUDE 59° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 51 7	0 52 56	0 54 45	0 56 38	0 58 34	1 0 31	1 2 30	1 4 32	1 6 36	1 8 42	1 10 50	1 13 0	1 15 13	1 17 29	1 19 45
1	0 51 41	0 53 28	0 55 31	0 57 13	0 59 8	1 1 8	1 3 24	1 5 12	1 7 18	1 9 25	1 11 55	1 13 46	1 16 0	1 18 18	1 21 3
2	0 52 7	0 54 0	0 56 1	0 57 48	0 59 43	1 1 45	1 4 0	1 5 53	1 8 0	1 10 8	1 12 36	1 14 32	1 16 48	1 19 7	1 21 51
3	0 52 35	0 54 32	0 56 35	0 58 23	1 0 18	1 2 22	1 4 38	1 6 34	1 8 42	1 10 51	1 13 20	1 15 18	1 17 36	1 19 56	1 22 39
4	0 53 6	0 55 5	0 57 8	0 58 59	1 0 53	1 3 0	1 5 17	1 7 15	1 9 24	1 11 34	1 14 4	1 16 4	1 18 24	1 20 45	1 23 29
5	0 53 39	0 55 38	0 57 42	0 59 35	1 1 29	1 3 38	1 5 57	1 7 56	1 10 6	1 12 17	1 14 50	1 16 53	1 19 12	1 21 33	1 24 21
6	0 54 11	0 56 11	0 58 18	1 0 11	1 2 7	1 4 16	1 6 38	1 8 37	1 10 48	1 13 0	1 15 37	1 17 38	1 20 0	1 22 22	1 25 15
7	0 54 44	0 56 44	0 58 54	1 0 47	1 2 45	1 4 55	1 7 20	1 9 18	1 11 30	1 13 44	1 16 28	1 18 25	1 20 48	1 23 11	1 26 10
8	0 55 17	0 57 17	0 59 24	1 1 23	1 3 23	1 5 34	1 7 54	1 9 59	1 12 13	1 14 28	1 17 3	1 19 12	1 21 36	1 24 1	1 27 6
9	0 55 50	0 57 50	0 59 55	1 1 59	1 4 1	1 6 13	1 8 29	1 10 40	1 12 56	1 15 12	1 17 41	1 19 59	1 22 24	1 24 51	1 28 3
10	0 56 23	0 58 23	1 0 26	1 2 35	1 4 40	1 6 51	1 9 4	1 11 21	1 13 39	1 15 56	1 18 20	1 20 46	1 23 12	1 25 42	1 29 0
11	0 56 59	0 58 59	1 1 12	1 3 17	1 5 20	1 7 31	1 9 58	1 12 13	1 14 27	1 16 46	1 19 10	1 21 36	1 24 2	1 26 35	1 29 56
12	0 57 37	0 59 37	1 1 58	1 4 0	1 6 3	1 8 13	1 10 52	1 13 6	1 15 17	1 17 38	1 20 3	1 22 28	1 24 54	1 27 31	1 30 52
13	0 58 16	1 0 16	1 2 44	1 4 44	1 6 48	1 8 57	1 11 46	1 14 0	1 16 9	1 18 32	1 20 59	1 23 22	1 25 48	1 28 30	1 31 48
14	0 58 56	1 0 56	1 3 30	1 5 30	1 7 35	1 9 44	1 12 40	1 14 54	1 17 3	1 19 28	1 21 57	1 24 19	1 26 56	1 29 31	1 32 45
15	0 59 37	1 1 38	1 4 16	1 6 17	1 8 24	1 10 34	1 13 34	1 15 49	1 17 59	1 20 26	1 22 57	1 25 19	1 28 0	1 30 34	1 33 42
16	1 0 19	1 2 21	1 5 2	1 7 6	1 9 14	1 11 26	1 14 28	1 16 45	1 18 57	1 21 27	1 23 58	1 26 21	1 29 6	1 31 50	1 34 39
17	1 1 2	1 3 6	1 5 49	1 7 56	1 10 7	1 12 21	1 15 22	1 17 42	1 20 6	1 22 30	1 25 0	1 27 24	1 30 4	1 32 50	1 35 36
18	1 1 46	1 3 52	1 6 37	1 8 47	1 11 1	1 13 17	1 16 16	1 18 39	1 21 6	1 23 34	1 26 3	1 28 30	1 31 14	1 34 3	1 36 54
19	1 2 31	1 4 39	1 7 26	1 9 38	1 11 56	1 14 14	1 17 10	1 19 36	1 22 6	1 24 38	1 27 7	1 29 38	1 32 25	1 35 17	1 38 13
20	1 3 17	1 5 27	1 8 15	1 10 29	1 12 51	1 15 12	1 18 4	1 20 33	1 23 7	1 25 42	1 28 13	1 30 49	1 33 37	1 36 33	1 39 32
21	1 4 3	1 6 17	1 9 4	1 11 20	1 13 46	1 16 11	1 19 2	1 21 31	1 24 8	1 26 46	1 29 21	1 32 2	1 34 49	1 37 50	1 40 51
22	1 4 50	1 7 8	1 9 54	1 12 11	1 14 41	1 17 11	1 19 57	1 22 29	1 25 9	1 27 50	1 30 31	1 33 18	1 36 2	1 39 9	1 42 10
23	1 5 39	1 7 59	1 10 27	1 13 2	1 15 36	1 18 12	1 20 49	1 23 27	1 26 10	1 28 55	1 31 44	1 34 36	1 37 31	1 40 29	1 43 29

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 51 7	0 52 56	0 54 45	0 56 38	0 58 34	1 0 31	1 2 30	1 4 32	1 6 36	1 8 42	1 10 50	1 13 0	1 15 13	1 17 29	1 19 45
1	0 50 39	0 52 27	0 54 15	0 56 7	0 58 1	0 59 57	1 1 55	1 3 55	1 5 58	1 8 3	1 10 11	1 12 19	1 14 31	1 16 45	1 19 0
2	0 50 11	0 51 57	0 53 45	0 55 36	0 57 28	0 59 22	1 1 19	1 3 18	1 5 20	1 7 24	1 9 31	1 11 38	1 13 45	1 16 1	1 18 15
3	0 49 42	0 51 28	0 53 15	0 55 4	0 56 54	0 58 47	1 0 43	1 2 41	1 4 42	1 6 43	1 8 51	1 10 57	1 13 5	1 15 17	1 17 30
4	0 49 13	0 50 58	0 52 45	0 54 32	0 56 20	0 58 12	1 0 7	1 2 4	1 4 4	1 6 5	1 8 11	1 10 16	1 12 22	1 14 32	1 16 44
5	0 48 44	0 50 28	0 52 14	0 54 0	0 55 46	0 57 37	0 59 31	1 1 27	1 3 26	1 5 27	1 7 31	1 9 35	1 11 39	1 13 47	1 15 58
6	0 48 13	0 49 58	0 51 44	0 53 30	0 55 15	0 57 6	0 58 59	1 0 53	1 2 51	1 4 50	1 6 53	1 8 56	1 10 56	1 13 4	1 15 14
7	0 47 42	0 49 27	0 51 14	0 53 0	0 54 44	0 56 34	0 58 26	1 0 19	1 2 16	1 4 13	1 6 15	1 8 17	1 10 12	1 12 21	1 14 30
8	0 47 11	0 48 56	0 50 44	0 52 29	0 54 13	0 56 2	0 57 53	0 59 45	1 1 41	1 3 36	1 5 37	1 7 38	1 9 28	1 11 36	1 13 46
9	0 46 40	0 48 25	0 50 14	0 51 58	0 53 42	0 55 30	0 57 20	0 59 11	1 1 6	1 2 59	1 4 59	1 6 59	1 8 44	1 10 54	1 13 2
10	0 46 9	0 47 54	0 49 44	0 51 27	0 53 11	0 54 58	0 56 47	0 58 37	1 0 30	1 2 22	1 4 20	1 6 20	1 8 0	1 10 11	1 12 17
11	0 45 44	0 47 24	0 49 11	0 50 54	0 52 37	0 54 23	0 56 12	0 57 59	0 59 51	1 1 43	1 3 40	1 5 39	1 7 20	1 9 28	1 11 35
12	0 45 17	0 46 53	0 48 37	0 50 20	0 52 2	0 53 47	0 55 34	0 57 19	0 59 11	1 1 3	1 2 58	1 4 56	1 6 39	1 8 44	1 10 53
13	0 44 48	0 46 20	0 48 1	0 49 44	0 51 25	0 53 9	0 54 54	0 56 39	0 58 30	1 0 22	1 2 14	1 4 10	1 5 56	1 7 59	1 10 11
14	0 44 16	0 45 46	0 47 24	0 49 5	0 50 45	0 52 28	0 54 12	0 55 57	0 57 47	0 59 40	1 1 29	1 3 21	1 5 11	1 7 14	1 9 29
15	0 43 37	0 45 11	0 46 46	0 48 23	0 50 2	0 51 45	0 53 28	0 55 13	0 57 2	0 58 55	1 0 42	1 2 30	1 4 25	1 6 28	1 8 46
16	0 43 2	0 44 35	0 46 7	0 47 41	0 49 20	0 51 2	0 52 44	0 54 29	0 56 17	0 58 11	0 59 58	1 1 41	1 3 38	1 5 40	1 7 56
17	0 42 25	0 43 57	0 45 27	0 46 59	0 48 38	0 50 18	0 51 59	0 53 44	0 55 32	0 57 26	0 59 12	1 0 52	1 2 49	1 4 50	1 7 3
18	0 41 46	0 43 17	0 44 46	0 46 17	0 47 55	0 49 34	0 51 14	0 52 59	0 54 46	0 56 38	0 58 22	1 0 3	1 1 59	1 3 58	1 6 6
19	0 41 5	0 42 35	0 44 4	0 45 35	0 47 12	0 48 50	0 50 29	0 52 13	0 53 59	0 55 47	0 57 31	0 59 14	1 1 8	1 3 4	1 5 5
20	0 40 21	0 41 50	0 43 20	0 44 53	0 46 29	0 48 6	0 49 44	0 51 26	0 53 11	0 54 54	0 56 38	0 58 25	1 0 15	1 2 7	1 4 1
21	0 39 31	0 41 2	0 42 31	0 44 4	0 45 37	0 47 14	0 48 49	0 50 30	0 52 13	0 53 55	0 55 39	0 57 25	0 59 14	1 0 59	1 2 53
22	0 38 33	0 40 4	0 41 32	0 43 5	0 44 37	0 46 14	0 47 47	0 49 27	0 51 8	0 52 49	0 54 33	0 56 19	0 58 5	0 59 49	1 1 42
23	0 37 27	0 38 52	0 40 19	0 41 52	0 43 22	0 44 59	0 46 34	0 48 12	0 49 51	0 51 32	0 53 15	0 55 1	0 56 48	0 58 34	1 0 27

LATITUDE 60° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 9 45	0 9 49	0 9 54	0 10 2	0 10 13	0 10 25	0 10 40	0 10 56	0 11 17	0 11 38	0 12 2	0 12 27	0 12 56	0 13 26	0 14 0
1	0 9 48	0 9 52	0 9 57	0 10 6	0 10 18	0 10 30	0 10 45	0 11 1	0 11 22	0 11 43	0 12 8	0 12 33	0 13 2	0 13 32	0 14 6
2	0 9 51	0 9 55	0 10 1	0 10 11	0 10 23	0 10 35	0 10 50	0 11 6	0 11 27	0 11 48	0 12 14	0 12 35	0 13 8	0 13 38	0 14 13
3	0 9 54	0 9 58	0 10 5	0 10 14	0 10 27	0 10 39	0 10 55	0 11 10	0 11 31	0 11 52	0 12 17	0 12 43	0 13 13	0 13 43	0 14 19
4	0 9 58	0 10 1	0 10 9	0 10 17	0 10 30	0 10 43	0 10 58	0 11 14	0 11 35	0 11 56	0 12 22	0 12 48	0 13 18	0 13 48	0 14 25
5	0 10 1	0 10 5	0 10 13	0 10 20	0 10 33	0 10 46	0 11 2	0 11 18	0 11 39	0 12 0	0 12 27	0 12 53	0 13 23	0 13 52	0 14 31
6	0 10 5	0 10 9	0 10 17	0 10 24	0 10 36	0 10 49	0 11 7	0 11 23	0 11 43	0 12 5	0 12 32	0 12 58	0 13 28	0 13 55	0 14 37
7	0 10 8	0 10 12	0 10 20	0 10 27	0 10 39	0 10 52	0 11 10	0 11 27	0 11 47	0 12 9	0 12 36	0 13 3	0 13 33	0 14 2	0 14 43
8	0 10 11	0 10 15	0 10 23	0 10 30	0 10 42	0 10 55	0 11 13	0 11 30	0 11 51	0 12 13	0 12 40	0 13 8	0 13 38	0 14 9	0 14 49
9	0 10 14	0 10 18	0 10 26	0 10 33	0 10 45	0 10 58	0 11 16	0 11 33	0 11 55	0 12 17	0 12 44	0 13 13	0 13 43	0 14 15	0 14 55
10	0 10 16	0 10 20	0 10 29	0 10 36	0 10 48	0 11 1	0 11 19	0 11 36	0 11 59	0 12 21	0 12 48	0 13 17	0 13 48	0 14 21	0 15 1
11	0 10 18	0 10 22	0 10 31	0 10 38	0 10 51	0 11 3	0 11 21	0 11 38	0 12 2	0 12 25	0 12 52	0 13 21	0 13 53	0 14 27	0 15 6
12	0 10 20	0 10 24	0 10 33	0 10 41	0 10 53	0 11 5	0 11 23	0 11 42	0 12 5	0 12 28	0 12 56	0 13 25	0 13 59	0 14 33	0 15 11
13	0 10 22	0 10 27	0 10 35	0 10 43	0 10 56	0 11 7	0 11 27	0 11 46	0 12 9	0 12 31	0 13 0	0 13 30	0 14 5	0 14 39	0 15 17
14	0 10 24	0 10 30	0 10 37	0 10 45	0 10 59	0 11 10	0 11 31	0 11 50	0 12 13	0 12 34	0 13 4	0 13 36	0 14 11	0 14 45	0 15 23
15	0 10 26	0 10 32	0 10 39	0 10 47	0 11 1	0 11 13	0 11 35	0 11 54	0 12 17	0 12 38	0 13 8	0 13 42	0 14 16	0 14 50	0 15 29
16	0 10 28	0 10 34	0 10 41	0 10 49	0 11 3	0 11 16	0 11 38	0 11 58	0 12 21	0 12 42	0 13 13	0 13 47	0 14 21	0 14 55	0 15 35
17	0 10 30	0 10 36	0 10 43	0 10 51	0 11 5	0 11 19	0 11 41	0 12 2	0 12 25	0 12 46	0 13 18	0 13 52	0 14 26	0 15 0	0 15 42
18	0 10 32	0 10 38	0 10 44	0 10 52	0 11 7	0 11 22	0 11 44	0 12 6	0 12 28	0 12 50	0 13 23	0 13 57	0 14 31	0 15 5	0 15 49
19	0 10 34	0 10 40	0 10 46	0 10 55	0 11 10	0 11 24	0 11 47	0 12 10	0 12 31	0 12 54	0 13 28	0 14 1	0 14 35	0 15 9	0 15 54
20	0 10 36	0 10 42	0 10 48	0 10 58	0 11 13	0 11 26	0 11 50	0 12 13	0 12 35	0 12 58	0 13 32	0 14 5	0 14 39	0 15 13	0 15 59
21	0 10 37	0 10 43	0 10 50	0 11 1	0 11 16	0 11 29	0 11 53	0 12 17	0 12 39	0 13 2	0 13 36	0 14 9	0 14 43	0 15 17	0 16 4
22	0 10 38	0 10 44	0 10 52	0 11 3	0 11 18	0 11 32	0 11 56	0 12 20	0 12 43	0 13 6	0 13 40	0 14 13	0 14 47	0 15 20	0 16 9
23	0 10 39	0 10 45	0 10 53	0 11 5	0 11 20	0 11 35	0 11 59	0 12 23	0 12 47	0 13 11	0 13 44	0 14 17	0 14 50	0 15 23	0 16 13

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 9 45	0 9 49	0 9 54	0 10 2	0 10 13	0 10 25	0 10 40	0 10 56	0 11 17	0 11 38	0 12 2	0 12 27	0 12 56	0 13 26	0 14 0
1	0 9 39	0 9 43	0 9 48	0 9 56	0 10 7	0 10 20	0 10 34	0 10 50	0 11 8	0 11 29	0 11 53	0 12 20	0 12 49	0 13 19	0 13 51
2	0 9 34	0 9 38	0 9 44	0 9 52	0 10 3	0 10 16	0 10 30	0 10 45	0 11 3	0 11 23	0 11 47	0 12 14	0 12 42	0 13 12	0 13 44
3	0 9 30	0 9 34	0 9 40	0 9 47	0 9 58	0 10 10	0 10 24	0 10 39	0 10 57	0 11 17	0 11 40	0 12 7	0 12 35	0 13 5	0 13 37
4	0 9 25	0 9 29	0 9 34	0 9 41	0 9 52	0 10 5	0 10 19	0 10 34	0 10 52	0 11 12	0 11 35	0 12 1	0 12 28	0 12 57	0 13 29
5	0 9 19	0 9 23	0 9 28	0 9 35	0 9 46	0 9 58	0 10 12	0 10 27	0 10 45	0 11 5	0 11 28	0 11 53	0 12 20	0 12 49	0 13 20
6	0 9 13	0 9 16	0 9 21	0 9 29	0 9 39	0 9 51	0 10 5	0 10 20	0 10 39	0 10 58	0 11 21	0 11 46	0 12 13	0 12 42	0 13 13
7	0 9 7	0 9 10	0 9 15	0 9 23	0 9 33	0 9 45	0 9 59	0 10 14	0 10 32	0 10 52	0 11 14	0 11 39	0 12 5	0 12 33	0 13 4
8	0 9 0	0 9 3	0 9 8	0 9 16	0 9 26	0 9 37	0 9 51	0 10 6	0 10 24	0 10 44	0 11 6	0 11 30	0 11 56	0 12 24	0 12 54
9	0 8 52	0 8 56	0 9 1	0 9 8	0 9 18	0 9 29	0 9 42	0 9 57	0 10 14	0 10 34	0 10 56	0 11 20	0 11 46	0 12 14	0 12 44
10	0 8 44	0 8 47	0 8 52	0 9 0	0 9 10	0 9 21	0 9 34	0 9 49	0 10 6	0 10 25	0 10 47	0 11 11	0 11 36	0 12 4	0 12 34
11	0 8 32	0 8 35	0 8 40	0 8 48	0 8 57	0 9 8	0 9 21	0 9 36	0 9 53	0 10 12	0 10 34	0 10 58	0 11 23	0 11 51	0 12 21
12	0 8 24	0 8 27	0 8 32	0 8 40	0 8 49	0 9 0	0 9 13	0 9 27	0 9 44	0 10 3	0 10 24	0 10 48	0 11 13	0 11 40	0 12 10
13	0 8 12	0 8 15	0 8 20	0 8 27	0 8 36	0 8 47	0 9 2	0 9 15	0 9 32	0 9 51	0 10 12	0 10 35	0 11 0	0 11 27	0 11 56
14	0 7 59	0 8 2	0 8 7	0 8 13	0 8 23	0 8 34	0 8 47	0 9 2	0 9 18	0 9 37	0 9 58	0 10 21	0 10 45	0 11 12	0 11 41
15	0 7 45	0 7 48	0 7 52	0 8 0	0 8 9	0 8 20	0 8 33	0 8 47	0 9 3	0 9 21	0 9 41	0 10 4	0 10 28	0 10 55	0 11 24
16	0 7 28	0 7 31	0 7 36	0 7 43	0 7 52	0 8 3	0 8 15	0 8 29	0 8 45	0 9 3	0 9 24	0 9 47	0 10 11	0 10 37	0 11 5
17	0 7 9	0 7 12	0 7 17	0 7 23	0 7 32	0 7 43	0 7 56	0 8 10	0 8 26	0 8 44	0 9 4	0 9 27	0 9 51	0 10 17	0 10 45
18	0 6 48	0 6 51	0 6 56	0 7 2	0 7 11	0 7 23	0 7 35	0 7 48	0 8 4	0 8 22	0 8 42	0 9 5	0 9 28	0 9 55	0 10 22
19	0 6 21	0 6 24	0 6 29	0 6 35	0 6 44	0 6 55	0 7 7	0 7 21	0 7 36	0 7 54	0 8 14	0 8 36	0 8 59	0 9 24	0 9 52
20	0 5 49	0 5 51	0 5 57	0 6 4	0 6 13	0 6 23	0 6 35	0 6 49	0 7 4	0 7 22	0 7 42	0 8 4	0 8 27	0 8 52	0 9 19
21	0 5 13	0 5 16	0 5 21	0 5 27	0 5 35	0 5 45	0 5 57	0 6 11	0 6 26	0 6 44	0 7 4	0 7 26	0 7 48	0 8 13	0 8 40
22	0 4 26	0 4 29	0 4 33	0 4 40	0 4 48	0 4 58	0 5 10	0 5 24	0 5 39	0 5 56	0 6 15	0 6 37	0 6 59	0 7 24	0 7 51
23	0 3 29	0 3 32	0 3 36	0 3 42	0 3 50	0 3 59	0 4 11	0 4 25	0 4 40	0 4 57	0 5 16	0 5 38	0 6 0	0 6 24	0 6 51

LATITUDE 60° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 14 34	0 15 13	0 15 51	0 16 34	0 17 17	0 18 4	0 18 52	0 19 44	0 20 36	0 21 33	0 22 30	0 23 31	0 24 32	0 25 36	0 26 41
1	0 14 41	0 15 20	0 15 59	0 16 42	0 17 26	0 18 14	0 19 2	0 19 54	0 20 47	0 21 44	0 22 42	0 23 43	0 24 45	0 25 50	0 26 56
2	0 14 48	0 15 27	0 16 7	0 16 51	0 17 35	0 18 23	0 19 12	0 20 5	0 20 58	0 21 55	0 22 54	0 23 55	0 24 58	0 26 4	0 27 12
3	0 14 55	0 15 34	0 16 14	0 16 58	0 17 43	0 18 32	0 19 21	0 20 14	0 21 8	0 22 7	0 23 7	0 24 8	0 25 11	0 26 18	0 27 28
4	0 15 0	0 15 40	0 16 21	0 17 5	0 17 50	0 18 40	0 19 30	0 20 23	0 21 18	0 22 19	0 23 20	0 24 21	0 25 23	0 26 33	0 27 44
5	0 15 7	0 15 46	0 16 29	0 17 12	0 17 57	0 18 48	0 19 38	0 20 32	0 21 28	0 22 28	0 23 28	0 24 32	0 25 37	0 26 46	0 27 55
6	0 15 13	0 15 52	0 16 37	0 17 19	0 18 4	0 18 56	0 19 47	0 20 41	0 21 38	0 22 37	0 23 36	0 24 43	0 25 51	0 26 59	0 28 7
7	0 15 20	0 15 59	0 16 44	0 17 27	0 18 12	0 19 4	0 19 56	0 20 51	0 21 48	0 22 48	0 23 48	0 24 55	0 26 4	0 27 13	0 28 22
8	0 15 26	0 16 6	0 16 51	0 17 35	0 18 20	0 19 13	0 20 5	0 21 1	0 21 59	0 22 59	0 24 0	0 25 7	0 26 17	0 27 27	0 28 38
9	0 15 32	0 16 13	0 16 58	0 17 43	0 18 29	0 19 22	0 20 14	0 21 11	0 22 10	0 23 10	0 24 12	0 25 19	0 26 30	0 27 41	0 28 53
10	0 15 38	0 16 20	0 17 5	0 17 51	0 18 38	0 19 31	0 20 23	0 21 21	0 22 21	0 23 22	0 24 24	0 25 32	0 26 43	0 27 55	0 29 8
11	0 15 43	0 16 27	0 17 12	0 17 59	0 18 47	0 19 40	0 20 33	0 21 32	0 22 32	0 23 34	0 24 37	0 25 46	0 26 57	0 28 10	0 29 23
12	0 15 50	0 16 34	0 17 19	0 18 7	0 18 56	0 19 49	0 20 43	0 21 43	0 22 43	0 23 46	0 24 50	0 26 0	0 27 11	0 28 25	0 29 39
13	0 15 57	0 16 41	0 17 26	0 18 15	0 19 5	0 19 59	0 20 53	0 21 54	0 22 56	0 23 59	0 25 3	0 26 15	0 27 26	0 28 41	0 29 56
14	0 16 4	0 16 48	0 17 33	0 18 23	0 19 14	0 20 9	0 21 3	0 22 5	0 23 9	0 24 12	0 25 17	0 26 30	0 27 41	0 28 57	0 30 13
15	0 16 11	0 16 55	0 17 41	0 18 32	0 19 24	0 20 19	0 21 13	0 22 17	0 23 22	0 24 26	0 25 31	0 26 45	0 27 57	0 29 14	0 30 30
16	0 16 18	0 17 3	0 17 49	0 18 41	0 19 34	0 20 29	0 21 23	0 22 29	0 23 35	0 24 40	0 25 45	0 27 0	0 28 13	0 29 31	0 30 47
17	0 16 26	0 17 11	0 17 57	0 18 50	0 19 44	0 20 39	0 21 33	0 22 41	0 23 49	0 24 54	0 25 59	0 27 15	0 28 30	0 29 48	0 31 4
18	0 16 34	0 17 19	0 18 4	0 18 59	0 19 54	0 20 49	0 21 44	0 22 53	0 24 3	0 25 8	0 26 13	0 27 30	0 28 47	0 30 5	0 31 21
19	0 16 40	0 17 26	0 18 12	0 19 8	0 20 4	0 21 0	0 21 56	0 23 5	0 24 17	0 25 22	0 26 28	0 27 47	0 29 5	0 30 23	0 31 39
20	0 16 46	0 17 33	0 18 20	0 19 17	0 20 14	0 21 11	0 22 8	0 23 18	0 24 30	0 25 36	0 26 44	0 28 4	0 29 23	0 30 42	0 31 58
21	0 16 52	0 17 40	0 18 28	0 19 26	0 20 24	0 21 22	0 22 20	0 23 31	0 24 43	0 25 50	0 27 0	0 28 21	0 29 41	0 31 2	0 32 19
22	0 16 58	0 17 47	0 18 36	0 19 35	0 20 34	0 21 33	0 22 33	0 23 43	0 24 56	0 26 5	0 27 16	0 28 38	0 29 59	0 31 21	0 32 41
23	0 17 3	0 17 53	0 18 44	0 19 44	0 20 45	0 21 45	0 22 46	0 23 57	0 25 9	0 26 20	0 27 32	0 28 55	0 30 18	0 31 41	0 33 4

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	16m	17m	18m	19m	20m	21m	22m	23m	24m	25m	26m	27m	28m	29m	30m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 14 34	0 15 13	0 15 51	0 16 34	0 17 17	0 18 4	0 18 52	0 19 44	0 20 36	0 21 33	0 22 30	0 23 31	0 24 32	0 25 36	0 26 41
1	0 14 25	0 15 1	0 15 39	0 16 21	0 17 6	0 17 52	0 18 40	0 19 31	0 20 24	0 21 19	0 22 16	0 23 15	0 24 17	0 25 20	0 26 26
2	0 14 18	0 14 54	0 15 32	0 16 13	0 16 58	0 17 44	0 18 32	0 19 22	0 20 14	0 21 8	0 22 4	0 23 3	0 24 13	0 25 7	0 26 12
3	0 14 11	0 14 46	0 15 24	0 16 5	0 16 49	0 17 34	0 18 21	0 19 10	0 20 2	0 20 56	0 21 52	0 22 50	0 23 51	0 24 53	0 25 58
4	0 14 3	0 14 38	0 15 15	0 15 56	0 16 40	0 17 24	0 18 11	0 19 0	0 19 51	0 20 44	0 21 39	0 22 37	0 23 37	0 24 39	0 25 43
5	0 13 54	0 14 29	0 15 6	0 15 45	0 16 29	0 17 13	0 17 59	0 18 48	0 19 39	0 20 32	0 21 27	0 22 24	0 23 23	0 24 24	0 25 27
6	0 13 46	0 14 21	0 14 58	0 15 37	0 16 19	0 17 3	0 17 47	0 18 35	0 19 27	0 20 19	0 21 13	0 22 10	0 23 9	0 24 10	0 25 13
7	0 13 37	0 14 11	0 14 48	0 15 27	0 16 9	0 16 52	0 17 37	0 18 25	0 19 15	0 20 7	0 21 1	0 21 57	0 22 55	0 23 55	0 24 57
8	0 13 27	0 14 1	0 14 37	0 15 16	0 15 58	0 16 41	0 17 26	0 18 13	0 19 3	0 19 54	0 20 47	0 21 42	0 22 40	0 23 39	0 24 41
9	0 13 17	0 13 51	0 14 27	0 15 5	0 15 46	0 16 28	0 17 13	0 18 0	0 18 49	0 19 40	0 20 33	0 21 28	0 22 25	0 23 24	0 24 25
10	0 13 6	0 13 40	0 14 16	0 14 54	0 15 34	0 16 16	0 17 0	0 17 46	0 18 35	0 19 25	0 20 18	0 21 13	0 22 9	0 23 7	0 24 7
11	0 12 53	0 13 26	0 14 1	0 14 38	0 15 18	0 16 0	0 16 44	0 17 30	0 18 19	0 19 8	0 20 0	0 20 54	0 21 50	0 22 47	0 23 47
12	0 12 42	0 13 15	0 13 50	0 14 27	0 15 7	0 15 48	0 16 31	0 17 16	0 18 4	0 18 53	0 19 44	0 20 38	0 21 34	0 22 31	0 23 30
13	0 12 27	0 13 0	0 13 35	0 14 12	0 14 51	0 15 32	0 16 15	0 17 0	0 17 47	0 18 35	0 19 26	0 20 19	0 21 14	0 22 11	0 23 10
14	0 12 12	0 12 44	0 13 18	0 13 54	0 14 34	0 15 14	0 15 56	0 16 41	0 17 28	0 18 16	0 19 6	0 19 59	0 20 54	0 21 50	0 22 48
15	0 11 55	0 12 27	0 13 1	0 13 37	0 14 16	0 14 56	0 15 38	0 16 22	0 17 9	0 17 57	0 18 47	0 19 39	0 20 33	0 21 28	0 22 26
16	0 11 36	0 12 8	0 12 42	0 13 18	0 13 56	0 14 35	0 15 17	0 16 1	0 16 47	0 17 34	0 18 23	0 19 15	0 20 9	0 21 4	0 22 1
17	0 11 15	0 11 46	0 12 19	0 12 55	0 13 33	0 14 12	0 14 53	0 15 37	0 16 23	0 17 10	0 17 59	0 18 50	0 19 43	0 20 37	0 21 33
18	0 10 52	0 11 23	0 11 56	0 12 31	0 13 9	0 13 48	0 14 29	0 15 12	0 15 57	0 16 43	0 17 31	0 18 22	0 19 15	0 20 9	0 21 5
19	0 10 22	0 10 53	0 11 26	0 12 1	0 12 38	0 13 16	0 13 56	0 14 39	0 15 24	0 16 10	0 16 58	0 17 48	0 18 40	0 19 33	0 20 29
20	0 9 49	0 10 19	0 10 52	0 11 27	0 12 4	0 12 42	0 13 22	0 14 4	0 14 48	0 15 33	0 16 20	0 17 10	0 18 3	0 18 56	0 19 51
21	0 9 9	0 9 39	0 10 11	0 10 46	0 11 23	0 12 0	0 12 40	0 13 22	0 14 6	0 14 51	0 15 38	0 16 27	0 17 19	0 18 11	0 19 5
22	0 8 20	0 8 50	0 9 22	0 9 56	0 10 32	0 11 9	0 11 48	0 12 30	0 13 14	0 13 58	0 14 45	0 15 34	0 16 25	0 17 17	0 18 11
23	0 7 20	0 7 49	0 8 21	0 8 55	0 9 31	0 10 8	0 10 47	0 11 28	0 12 11	0 12 55	0 13 41	0 14 29	0 15 20	0 16 11	0 17 4

LATITUDE 60° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 27 52	0 29 3	0 30 18	0 31 33	0 32 50	0 34 10	0 35 31	0 36 53	0 38 23	0 39 53	0 41 23	0 42 53	0 44 32	0 46 12	0 47 49
1	0 28 7	0 29 19	0 30 34	0 31 47	0 33 8	0 34 30	0 35 51	0 37 14	0 38 44	0 40 15	0 41 46	0 43 17	0 44 57	0 46 38	0 48 21
2	0 28 23	0 29 35	0 30 50	0 32 4	0 33 26	0 34 50	0 36 11	0 37 35	0 39 6	0 40 37	0 42 9	0 43 41	0 45 22	0 47 5	0 48 53
3	0 28 39	0 29 51	0 31 6	0 32 21	0 33 45	0 35 10	0 36 32	0 37 56	0 39 28	0 41 0	0 42 33	0 44 6	0 45 48	0 47 32	0 49 26
4	0 28 55	0 30 6	0 31 23	0 32 39	0 34 4	0 35 30	0 36 53	0 38 17	0 39 49	0 41 23	0 42 56	0 44 30	0 46 14	0 47 59	0 49 59
5	0 29 9	0 30 23	0 31 40	0 32 57	0 34 25	0 35 50	0 37 14	0 38 38	0 40 11	0 41 45	0 43 20	0 44 55	0 46 40	0 48 26	0 50 32
6	0 29 26	0 30 41	0 31 58	0 33 15	0 34 42	0 36 10	0 37 34	0 38 59	0 40 33	0 42 8	0 43 44	0 45 20	0 47 6	0 48 53	0 51 5
7	0 29 39	0 30 57	0 32 11	0 33 32	0 34 57	0 36 30	0 37 55	0 39 20	0 40 55	0 42 32	0 44 8	0 45 45	0 47 32	0 49 20	0 51 29
8	0 29 55	0 31 13	0 32 25	0 33 45	0 35 12	0 36 50	0 38 16	0 39 42	0 41 18	0 42 56	0 44 33	0 46 11	0 47 59	0 49 48	0 51 53
9	0 30 11	0 31 29	0 32 39	0 33 56	0 35 27	0 37 10	0 38 37	0 40 4	0 41 42	0 43 21	0 44 59	0 46 38	0 48 27	0 50 17	0 52 18
10	0 30 27	0 31 45	0 32 53	0 34 4	0 35 44	0 37 30	0 38 58	0 40 26	0 42 6	0 43 47	0 45 26	0 47 5	0 48 56	0 50 48	0 52 44
11	0 30 43	0 32 2	0 33 7	0 34 13	0 36 0	0 37 50	0 39 19	0 40 49	0 42 31	0 44 14	0 45 54	0 47 33	0 49 26	0 51 20	0 53 11
12	0 30 59	0 32 20	0 33 21	0 34 22	0 36 16	0 38 10	0 39 41	0 41 13	0 42 57	0 44 42	0 46 22	0 48 2	0 49 57	0 51 53	0 53 39
13	0 31 16	0 32 39	0 33 45	0 34 50	0 36 42	0 38 32	0 40 4	0 41 37	0 43 23	0 45 10	0 46 50	0 48 31	0 50 28	0 52 25	0 54 10
14	0 31 34	0 32 58	0 34 9	0 35 18	0 37 8	0 38 54	0 40 28	0 42 2	0 43 50	0 45 38	0 47 19	0 49 1	0 50 59	0 52 56	0 54 41
15	0 31 53	0 33 17	0 34 33	0 35 47	0 37 34	0 39 18	0 40 53	0 42 28	0 44 17	0 46 6	0 47 48	0 49 32	0 51 30	0 53 27	0 55 13
16	0 32 13	0 33 37	0 34 57	0 36 16	0 38 0	0 39 42	0 41 19	0 42 55	0 44 45	0 46 34	0 48 18	0 50 4	0 52 1	0 53 58	0 55 46
17	0 32 34	0 33 57	0 35 21	0 36 45	0 38 26	0 40 8	0 41 46	0 43 23	0 45 13	0 47 2	0 48 49	0 50 36	0 52 32	0 54 29	0 56 20
18	0 32 49	0 34 17	0 35 45	0 37 14	0 38 53	0 40 33	0 42 13	0 43 53	0 45 42	0 47 31	0 49 20	0 51 9	0 53 4	0 55 0	0 56 55
19	0 33 11	0 34 39	0 36 9	0 37 39	0 39 20	0 41 0	0 42 41	0 44 23	0 46 13	0 48 3	0 49 52	0 51 44	0 53 39	0 55 35	0 57 33
20	0 33 33	0 35 3	0 36 34	0 38 5	0 39 47	0 41 28	0 43 10	0 44 53	0 46 45	0 48 37	0 50 27	0 52 21	0 54 17	0 56 15	0 58 15
21	0 33 55	0 35 27	0 36 59	0 38 31	0 40 14	0 41 57	0 43 40	0 45 24	0 47 18	0 49 11	0 51 4	0 53 0	0 54 58	0 56 58	0 59 1
22	0 34 17	0 35 50	0 37 24	0 38 57	0 40 42	0 42 26	0 44 11	0 45 56	0 47 52	0 49 47	0 51 42	0 53 39	0 55 42	0 57 43	0 59 51
23	0 34 39	0 36 14	0 37 49	0 39 24	0 41 10	0 42 56	0 44 42	0 46 29	0 48 26	0 50 24	0 52 21	0 54 19	0 56 28	0 58 37	1 0 46

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.														
	31m	32m	33m	34m	35m	36m	37m	38m	39m	40m	41m	42m	43m	44m	45m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 27 52	0 29 3	0 30 18	0 31 33	0 32 50	0 34 10	0 35 31	0 36 53	0 38 23	0 39 53	0 41 23	0 42 53	0 44 32	0 46 12	0 47 49
1	0 27 34	0 28 45	0 29 58	0 31 13	0 32 30	0 33 50	0 35 12	0 36 36	0 38 2	0 39 30	0 41 0	0 42 32	0 44 7	0 45 44	0 47 22
2	0 27 19	0 28 30	0 29 42	0 30 56	0 32 13	0 33 31	0 34 52	0 36 15	0 37 40	0 39 8	0 40 37	0 42 9	0 43 43	0 45 19	0 46 56
3	0 27 5	0 28 14	0 29 25	0 30 38	0 31 54	0 33 12	0 34 32	0 35 54	0 37 18	0 38 45	0 40 14	0 41 45	0 43 18	0 44 53	0 46 29
4	0 26 49	0 27 58	0 29 9	0 30 22	0 31 37	0 32 54	0 34 13	0 35 34	0 36 57	0 38 23	0 39 51	0 41 21	0 42 53	0 44 27	0 46 2
5	0 26 33	0 27 41	0 28 51	0 30 3	0 31 17	0 32 34	0 33 52	0 35 12	0 36 35	0 38 0	0 39 27	0 40 56	0 42 27	0 44 1	0 45 35
6	0 26 18	0 27 25	0 28 34	0 29 45	0 30 59	0 32 15	0 33 32	0 34 52	0 36 14	0 37 38	0 39 4	0 40 32	0 42 2	0 43 35	0 45 8
7	0 26 1	0 27 8	0 28 16	0 29 26	0 30 38	0 31 52	0 33 10	0 34 30	0 35 52	0 37 18	0 38 42	0 40 9	0 41 38	0 43 9	0 44 42
8	0 25 45	0 26 51	0 27 59	0 29 9	0 30 19	0 31 36	0 32 52	0 34 10	0 35 30	0 36 53	0 38 17	0 39 43	0 41 12	0 42 43	0 44 14
9	0 25 28	0 26 33	0 27 40	0 28 49	0 30 1	0 31 15	0 32 30	0 33 47	0 35 7	0 36 29	0 37 52	0 39 18	0 40 46	0 42 16	0 43 46
10	0 25 10	0 26 15	0 27 21	0 28 30	0 29 41	0 30 54	0 32 8	0 33 25	0 34 44	0 36 5	0 37 28	0 38 53	0 40 20	0 41 49	0 43 18
11	0 24 49	0 25 53	0 26 59	0 28 7	0 29 17	0 30 30	0 31 44	0 33 0	0 34 19	0 35 38	0 37 0	0 38 24	0 39 50	0 41 19	0 42 47
12	0 24 31	0 25 35	0 26 40	0 27 48	0 28 58	0 30 10	0 31 23	0 32 38	0 33 55	0 35 15	0 36 36	0 37 59	0 39 24	0 40 52	0 42 19
13	0 24 11	0 25 14	0 26 18	0 27 25	0 28 34	0 29 45	0 30 57	0 32 12	0 33 29	0 34 48	0 36 8	0 37 30	0 38 55	0 40 22	0 41 48
14	0 23 48	0 24 51	0 25 55	0 27 1	0 28 9	0 29 20	0 30 32	0 31 46	0 33 2	0 34 20	0 35 39	0 37 1	0 38 25	0 39 51	0 41 17
15	0 23 26	0 24 28	0 25 31	0 26 37	0 27 45	0 28 54	0 30 5	0 31 18	0 32 33	0 33 51	0 35 10	0 36 31	0 37 54	0 39 19	0 40 44
16	0 23 0	0 24 1	0 25 4	0 26 9	0 27 16	0 28 25	0 29 35	0 30 48	0 32 3	0 33 20	0 34 38	0 35 58	0 37 20	0 38 44	0 40 8
17	0 22 32	0 23 33	0 24 35	0 25 39	0 26 46	0 27 55	0 29 4	0 30 16	0 31 30	0 32 46	0 34 3	0 35 22	0 36 44	0 38 8	0 39 31
18	0 22 3	0 23 3	0 24 4	0 25 8	0 26 14	0 27 22	0 28 31	0 29 42	0 30 55	0 32 11	0 33 27	0 34 46	0 36 7	0 37 30	0 38 52
19	0 21 27	0 22 27	0 23 28	0 24 31	0 25 36	0 26 43	0 27 51	0 29 2	0 30 15	0 31 30	0 32 45	0 34 0	0 35 20	0 36 45	0 38 7
20	0 20 48	0 21 47	0 22 47	0 23 49	0 24 54	0 26 1	0 27 8	0 28 18	0 29 30	0 30 44	0 31 59	0 33 16	0 34 35	0 35 57	0 37 18
21	0 20 2	0 21 1	0 22 0	0 23 2	0 24 6	0 25 12	0 26 19	0 27 28	0 28 39	0 29 53	0 31 7	0 32 23	0 33 42	0 35 3	0 36 23
22	0 19 7	0 20 5	0 21 4	0 22 5	0 23 8	0 24 14	0 25 25	0 26 38	0 27 54	0 29 12	0 30 20	0 31 31	0 32 44	0 33 59	0 35 18
23	0 18 0	0 18 58	0 19 56	0 20 57	0 22 0	0 23 5	0 24 10	0 25 18	0 26 28	0 27 40	0 28 53	0 30 8	0 31 25	0 32 44	0 34 2

LATITUDE 60° NORTH OR SOUTH.

Declination same name as Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 49 27	0 51 16	0 53 6	0 54 51	0 56 35	0 58 36	1 0 36	1 2 36	1 4 37	1 6 39	1 8 42	1 10 45	1 12 50	1 14 59	1 17 12
1	0 50 5	0 51 51	0 53 37	0 55 23	0 57 9	0 59 10	1 1 12	1 3 13	1 5 15	1 7 18	1 9 23	1 11 22	1 13 20	1 15 30	1 18 0
2	0 50 43	0 52 26	0 54 8	0 55 55	0 57 42	0 59 44	1 1 48	1 3 50	1 5 54	1 7 59	1 10 4	1 12 4	1 14 3	1 16 25	1 18 48
3	0 51 21	0 53 1	0 54 39	0 56 27	0 58 15	1 0 19	1 2 24	1 4 28	1 6 33	1 8 39	1 10 45	1 12 46	1 14 46	1 17 11	1 19 37
4	0 52 0	0 53 36	0 55 10	0 56 59	0 58 48	1 0 54	1 3 0	1 5 5	1 7 11	1 9 18	1 11 26	1 13 28	1 15 29	1 17 57	1 20 26
5	0 52 39	0 54 11	0 55 42	0 57 31	0 59 21	1 1 29	1 3 37	1 5 44	1 7 51	1 9 59	1 12 8	1 14 10	1 16 12	1 18 43	1 21 15
6	0 53 18	0 54 46	0 56 14	0 58 4	0 59 54	1 2 4	1 4 14	1 6 22	1 8 31	1 10 40	1 12 50	1 14 52	1 16 55	1 19 29	1 22 4
7	0 53 39	0 55 11	0 56 46	0 58 41	1 0 34	1 2 43	1 4 51	1 7 0	1 9 10	1 11 21	1 13 32	1 15 36	1 17 43	1 20 19	1 22 55
8	0 54 0	0 55 37	0 57 19	0 59 19	1 1 14	1 3 22	1 5 29	1 7 40	1 9 51	1 12 3	1 14 15	1 16 21	1 18 32	1 21 10	1 23 47
9	0 54 21	0 56 5	0 57 54	0 59 57	1 1 55	1 4 2	1 6 8	1 8 20	1 10 32	1 12 45	1 14 58	1 17 7	1 19 22	1 22 2	1 24 39
10	0 54 42	0 56 34	0 58 30	1 0 35	1 2 36	1 4 42	1 6 47	1 9 0	1 11 13	1 13 27	1 15 41	1 17 55	1 20 14	1 22 54	1 25 31
11	0 55 4	0 57 4	0 59 7	1 1 13	1 3 16	1 5 22	1 7 27	1 9 41	1 11 55	1 14 10	1 16 25	1 18 44	1 21 7	1 23 46	1 26 24
12	0 55 26	0 57 35	0 59 45	1 1 50	1 3 56	1 6 2	1 8 8	1 10 23	1 12 38	1 14 54	1 17 10	1 19 35	1 22 1	1 24 39	1 27 17
13	0 55 52	0 58 7	1 0 21	1 2 27	1 4 35	1 6 43	1 8 50	1 11 6	1 13 22	1 15 39	1 17 56	1 20 26	1 22 55	1 25 32	1 28 10
14	0 56 21	0 58 40	1 0 56	1 3 4	1 5 14	1 7 24	1 9 33	1 11 50	1 14 8	1 16 26	1 18 44	1 21 18	1 23 49	1 26 26	1 29 3
15	0 56 54	0 59 14	1 1 31	1 3 41	1 5 53	1 8 5	1 10 16	1 12 35	1 14 55	1 17 15	1 19 35	1 22 11	1 24 43	1 27 20	1 29 57
16	0 57 30	0 59 50	1 2 7	1 4 18	1 6 32	1 8 46	1 11 0	1 13 22	1 15 44	1 18 6	1 20 28	1 23 4	1 25 37	1 28 14	1 30 51
17	0 58 9	1 0 27	1 2 44	1 4 55	1 7 11	1 9 29	1 11 46	1 14 10	1 16 34	1 18 58	1 21 23	1 23 57	1 26 31	1 29 8	1 31 46
18	0 58 51	1 1 5	1 3 20	1 5 35	1 7 50	1 10 12	1 12 34	1 14 56	1 17 19	1 19 52	1 22 20	1 24 51	1 27 22	1 30 2	1 32 42
19	0 59 34	1 1 47	1 4 2	1 6 19	1 8 35	1 10 59	1 13 25	1 15 48	1 18 13	1 20 48	1 23 20	1 25 51	1 28 21	1 31 0	1 33 39
20	1 0 20	1 2 33	1 4 48	1 7 5	1 9 24	1 11 50	1 14 19	1 16 43	1 19 11	1 21 46	1 24 22	1 26 54	1 29 23	1 32 0	1 34 36
21	1 1 9	1 3 23	1 5 38	1 7 56	1 10 17	1 12 45	1 15 16	1 17 41	1 20 11	1 22 48	1 25 26	1 28 0	1 30 33	1 33 3	1 35 33
22	1 2 1	1 4 17	1 6 34	1 8 53	1 11 14	1 13 43	1 16 16	1 18 43	1 21 13	1 23 53	1 26 32	1 29 10	1 31 47	1 34 8	1 36 30
23	1 2 56	1 5 16	1 7 36	1 9 56	1 12 16	1 14 46	1 17 17	1 19 48	1 22 19	1 25 0	1 27 41	1 30 23	1 33 5	1 35 16	1 37 28

Declination contrary name to Latitude.

Sun's Dec.	HOUR ANGLE OR TIME FROM NOON.													
	46m	47m	48m	49m	50m	51m	52m	53m	54m	55m	56m	57m	58m	59m	60m
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
0°	0 49 27	0 51 16	0 53 6	0 54 51	0 56 35	0 58 36	1 0 36	1 2 36	1 4 37	1 6 39	1 8 42	1 10 45	1 12 50	1 14 59	1 17 12
1	0 49 3	0 50 47	0 52 34	0 54 23	0 56 14	0 58 7	1 0 2	1 1 59	1 3 58	1 5 59	1 8 1	1 10 5	1 12 12	1 14 23	1 16 36
2	0 48 36	0 50 19	0 52 5	0 53 52	0 55 41	0 57 35	0 59 26	1 1 22	1 3 20	1 5 20	1 7 22	1 9 26	1 11 31	1 13 40	1 15 52
3	0 48 8	0 49 50	0 51 35	0 53 21	0 55 9	0 56 59	0 58 52	1 0 46	1 2 43	1 4 42	1 6 43	1 8 44	1 10 49	1 12 57	1 15 8
4	0 47 40	0 49 21	0 51 8	0 52 51	0 54 38	0 56 27	0 58 18	1 0 11	1 2 7	1 4 5	1 6 5	1 8 5	1 10 8	1 12 15	1 14 25
5	0 47 12	0 48 52	0 50 35	0 52 19	0 54 5	0 55 53	0 57 44	0 59 36	1 1 30	1 3 27	1 5 26	1 7 25	1 9 27	1 11 32	1 13 41
6	0 46 44	0 48 23	0 50 6	0 51 49	0 53 34	0 55 21	0 57 10	0 59 1	1 0 54	1 2 49	1 4 48	1 6 46	1 8 47	1 10 51	1 12 59
7	0 46 19	0 47 59	0 49 42	0 51 22	0 53 4	0 54 49	0 56 36	0 58 26	1 0 18	1 2 12	1 4 10	1 6 7	1 8 7	1 10 10	1 12 16
8	0 45 48	0 47 25	0 49 6	0 50 47	0 52 30	0 54 15	0 56 3	0 57 52	0 59 43	1 1 36	1 3 32	1 5 27	1 7 26	1 9 28	1 11 33
9	0 45 19	0 46 55	0 48 35	0 50 15	0 51 57	0 53 41	0 55 27	0 57 15	0 59 5	1 0 57	1 2 52	1 4 43	1 6 41	1 8 42	1 10 49
10	0 44 50	0 46 26	0 48 5	0 49 44	0 51 25	0 53 8	0 54 54	0 56 41	0 58 30	1 0 21	1 2 14	1 4 7	1 6 4	1 8 4	1 10 6
11	0 44 18	0 45 53	0 47 31	0 49 9	0 50 49	0 52 31	0 54 16	0 56 2	0 57 50	0 59 40	1 1 32	1 3 24	1 5 19	1 7 18	1 9 20
12	0 43 50	0 45 24	0 47 1	0 48 38	0 50 17	0 51 58	0 53 42	0 55 27	0 57 14	0 59 3	1 0 55	1 2 46	1 4 40	1 6 37	1 8 38
13	0 43 18	0 44 51	0 46 27	0 48 3	0 49 41	0 51 21	0 53 4	0 54 48	0 56 34	0 58 22	1 0 13	1 2 3	1 3 56	1 5 52	1 7 52
14	0 42 46	0 44 18	0 45 53	0 47 28	0 49 5	0 50 44	0 52 26	0 54 9	0 55 54	0 57 41	0 59 30	1 1 19	1 3 11	1 5 6	1 7 5
15	0 42 12	0 43 43	0 45 18	0 46 52	0 48 28	0 50 7	0 51 48	0 53 30	0 55 14	0 57 0	0 58 48	1 0 36	1 2 27	1 4 21	1 6 19
16	0 41 35	0 43 6	0 44 40	0 46 13	0 47 48	0 49 26	0 51 6	0 52 47	0 54 30	0 56 15	0 58 2	0 59 49	1 1 39	1 3 32	1 5 29
17	0 40 57	0 42 27	0 44 0	0 45 32	0 47 7	0 48 44	0 50 23	0 52 3	0 53 45	0 55 29	0 57 16	0 59 2	1 0 51	1 2 43	1 4 38
18	0 40 18	0 41 47	0 43 19	0 44 52	0 46 27	0 48 4	0 49 44	0 51 21	0 53 0	0 54 42	0 56 27	0 58 12	1 0 0	1 1 51	1 3 45
19	0 39 32	0 41 0	0 42 31	0 44 1	0 45 34	0 47 9	0 48 46	0 50 24	0 52 4	0 53 46	0 55 31	0 57 15	0 59 2	1 0 52	1 2 45
20	0 38 42	0 40 9	0 41 39	0 43 9	0 44 41	0 46 15	0 47 51	0 49 28	0 51 7	0 52 48	0 54 33	0 56 16	0 58 2	0 59 51	1 1 43
21	0 37 46	0 39 12	0 40 42	0 42 11	0 43 42	0 45 15	0 46 51	0 48 27	0 50 5	0 51 43	0 53 28	0 55 10	0 56 55	0 58 43	1 0 34
22	0 36 40	0 38 6	0 39 35	0 41 3	0 42 33	0 44 5	0 45 40	0 47 15	0 48 52	0 50 32	0 52 14	0 54 5	0 55 49	0 57 36	0 59 16
23	0 35 24	0 36 49	0 38 17	0 39 44	0 41 13	0 42 44	0 44 18	0 45 52	0 47 28	0 49 7	0 50 48	0 52 36	0 54 26	0 56 19	0 58 16